

Accurate fitting of measured reflectances using a Shifted Gamma micro-facet distribution - Supplemental

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This document is supplemental to the paper titled *Accurate fitting of measured reflectances using a Shifted Gamma micro-facet distribution*. In the following section we list the equations for the Cook-Torrance micro-facets model with the SGD probability distribution function. Next, we explain how to use importance sampling with the SGD distribution.

This supplemental material contains complete fitting results for 100 isotropic measured materials from the MERL database, together with sample images, and comparisons with both the ground truth and Cook-Torrance with Beckmann distribution, as well as BRDF plots in the incidence plane in three separate red, green, and blue channels, and Fresnel plots¹.

¹The Beckmann images and it's corresponding BRDF lobes are not available for some of the materials.

The reflectance function

The Cook-Torrance micro-facets reflectance model is:

$$\begin{aligned}\rho(\mathbf{i}, \mathbf{o}) &= \rho_{diffuse}(\mathbf{i}, \mathbf{o}) + \rho_{specular}(\mathbf{i}, \mathbf{o}) \\ &= \frac{\rho_d}{\pi} + \frac{\rho_s}{\pi} \frac{F(\mathbf{i} \cdot \mathbf{h}) D(\theta_h) G(\mathbf{i}, \mathbf{o})}{\cos(\theta_i) \cos(\theta_o)}\end{aligned}$$

where \mathbf{i} is the incoming direction, \mathbf{o} is the outgoing direction, \mathbf{h} is the half-vector ($\mathbf{h} = \mathbf{i} + \mathbf{o}$, normalized). θ_i , θ_o and θ_h are the respective angles between these vectors and the normal \mathbf{n} . Also ρ_d and ρ_s are the diffuse and specular coefficients in RGB, respectively.

The SGD normal distribution function is:

$$\begin{aligned}D(\theta_m) &= \frac{\chi_{[0, \frac{\pi}{2}]}(\theta_m)}{\pi \cos^4 \theta_m} P_{22}(\tan^2 \theta_m) \\ P_{22}(x) &= K_{\alpha, p} \frac{e^{-(\alpha + \frac{x}{\alpha})}}{\left(\alpha + \frac{x}{\alpha}\right)^p} \\ K_{\alpha, p} &= \frac{1}{\alpha \Gamma(1-p, \alpha)}\end{aligned}$$

Using this distribution, the shadowing and masking function G is:

$$\begin{aligned}G(\mathbf{i}, \mathbf{o}) &= G_1(\mathbf{i}) G_1(\mathbf{o}) \\ G_1(\theta) &= \frac{\chi_{[0, \frac{\pi}{2}]}(\theta)}{1 + \Lambda(\theta)} \\ \Lambda(\theta) &= \int_{\frac{1}{\tan \theta}}^{\infty} (r \tan \theta - 1) P_2(r) dr \\ P_2(r) &= \frac{1}{\sqrt{\pi \alpha} \Gamma(1-p, \alpha)} U\left(p, p + \frac{1}{2}, \alpha + \frac{r^2}{\alpha}\right) e^{-\alpha - \frac{r^2}{\alpha}}\end{aligned}$$

where U is the confluent hyper-geometric function of the second kind.

Alternatively, the following approximation can be used:

$$\begin{aligned}G_1(\theta) &\approx \begin{cases} 1 + \lambda \left(1 - e^{c(\theta - \theta_0)^k}\right) & \text{if } \theta > \theta_0 \\ 1 & \text{if } \theta \leq \theta_0 \end{cases} \\ \theta_0 &= \frac{\pi}{2} - \left(\frac{\log\left(1 + \frac{1}{\lambda}\right)}{c}\right)^{\frac{1}{k}}\end{aligned}$$

The Fresnel term is:

$$F(\theta_d) = F_0 + (1 - F_0)(1 - \cos \theta_d)^5 - F_1 \cos \theta_d$$

Importance sampling

For importance sampling according to the GGX distribution, use the following equation to sample $D_{GGX}(\mathbf{m}) \cos \theta_m$:

$$\mathbf{m} = (\cos \phi_m \sin \theta_m, \sin \phi_m \sin \theta_m, \cos \theta_m)$$

where,

$$\begin{aligned}\theta_m &= \arctan\left(\frac{\alpha \sqrt{u_2}}{\sqrt{1-u_2}}\right) \\ \phi_m &= 2\pi u_1\end{aligned}$$

where u_1 and u_2 are realizations of a uniform random variable in $[0, 1]$.

Given the incoming direction, \mathbf{i} , the outgoing direction, \mathbf{o} , can be found by:

$$\mathbf{o} = 2|\mathbf{i} \cdot \mathbf{m}| \mathbf{m} - \mathbf{i}$$

Since the diffuse and specular components of the BRDF require different importance sampling weights, we sample the specular component with probability p_{specular} :

$$p_{\text{specular}} = \frac{\rho_s}{\rho_d + \rho_s}$$

and sample the diffuse component with probability $1 - p_{\text{specular}}$.

The importance sampling weight must be multiplied by the inverse of this probability depending on whether the specular or diffuse component is selected for each individual sample.

Therefore, the importance sampling weight for the specular component is:

$$w_{\text{specular}} = \frac{4\pi}{p_{\text{specular}}} \rho_{\text{specular}}(\mathbf{i}, \mathbf{o}) \cos \theta_i \cos \theta_o \cos^3 \theta_m \frac{(\alpha^2 + \tan^2 \theta)^2}{\alpha^2}$$

where,

$$\rho_{\text{specular}}(\mathbf{i}, \mathbf{o}) = \frac{\rho_s}{\pi} \frac{F(\mathbf{i} \cdot \mathbf{h}) D(\theta_h) G(\mathbf{i}, \mathbf{o})}{\cos \theta_i \cos \theta_o}$$

It simplifies to:

$$w_{\text{specular}} = \frac{4\rho_s}{p_{\text{specular}}} F(\mathbf{i} \cdot \mathbf{h}) D(\theta_h) G(\mathbf{i}, \mathbf{o}) \cos^3 \theta_m \frac{(\alpha^2 + \tan^2 \theta)^2}{\alpha^2}$$

, and the importance sampling weight for the diffuse component is:

$$w_{\text{diffuse}} = \frac{\rho_d}{1 - p_{\text{specular}}}$$

The integrated illumination will be:

$$I(\theta_o) = \frac{1}{N} \sum_{k=0}^N w L(i_k)$$

Material Name: *alum-bronze*

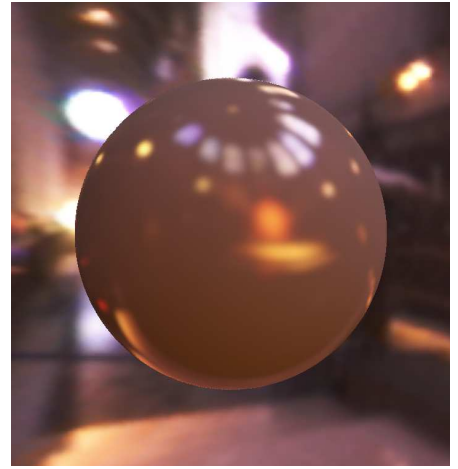
Rendered Images



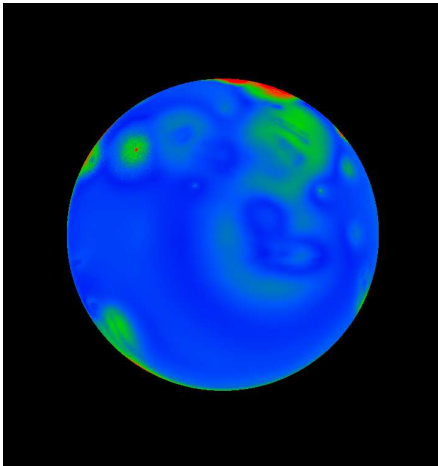
SGD



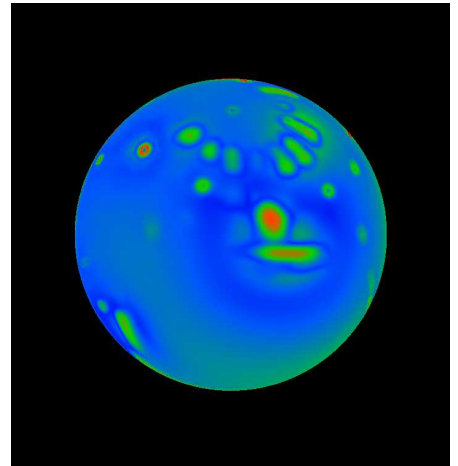
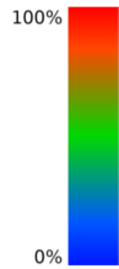
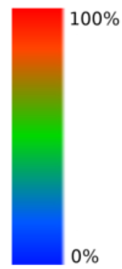
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

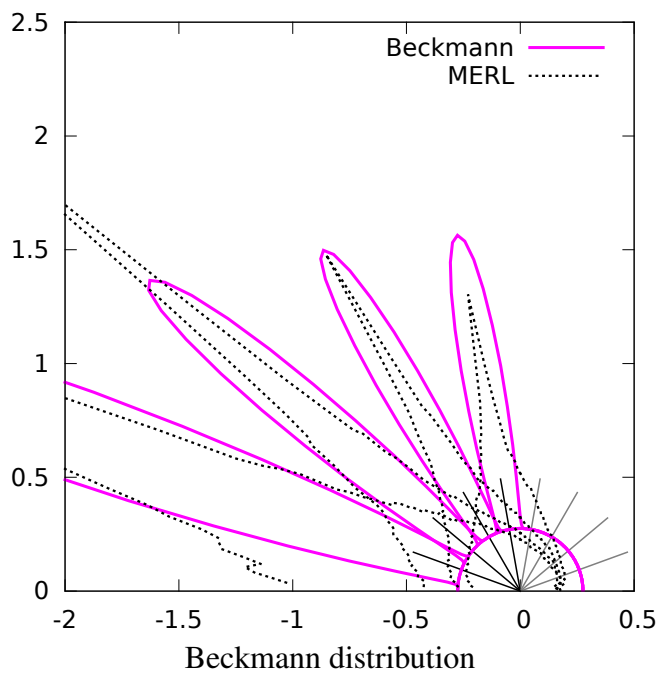
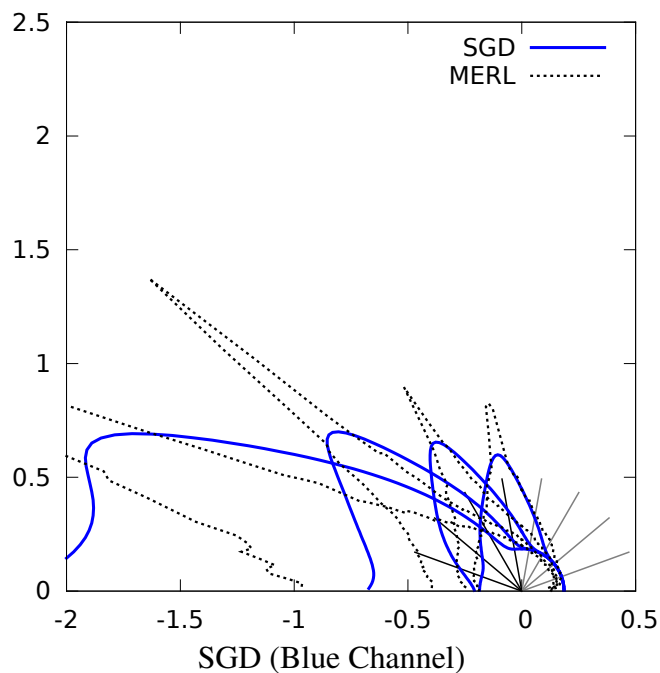
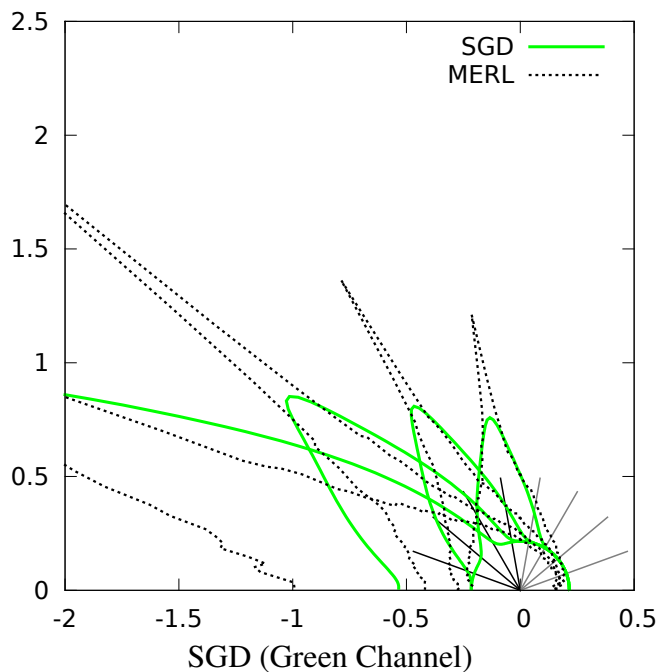
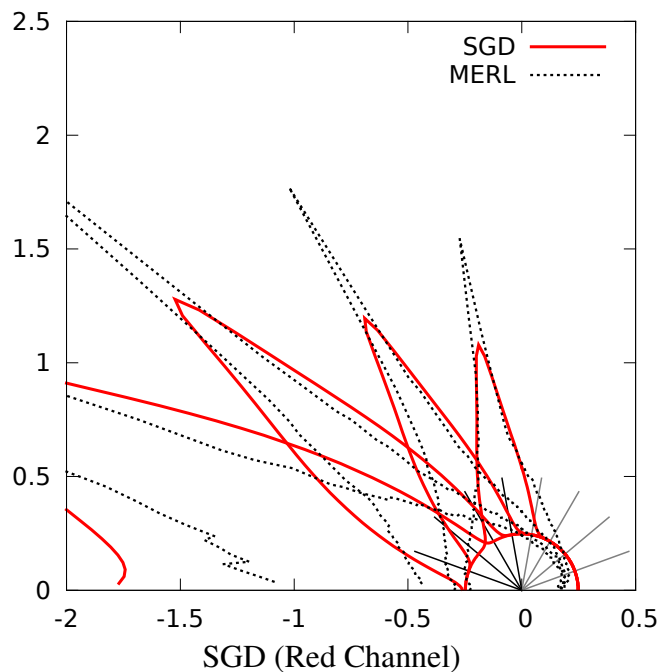
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0478786	0.0364976	0.014832	0.459076	6.05524	5.05524	46.3841	0.100735
Green	0.0313514	0.664975	0.0300126	0.450056	0.235756	0.182842	24.5961	0.0878706
Blue	0.0200638	0.268836	0.0490339	0.529272	0.580647	0.476088	14.8261	0.0861907

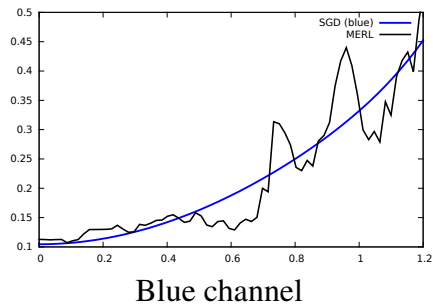
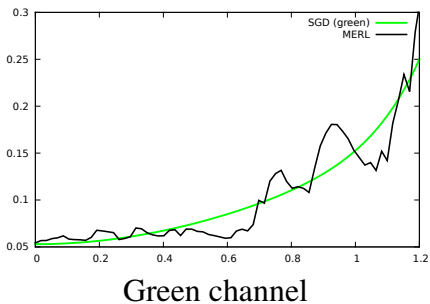
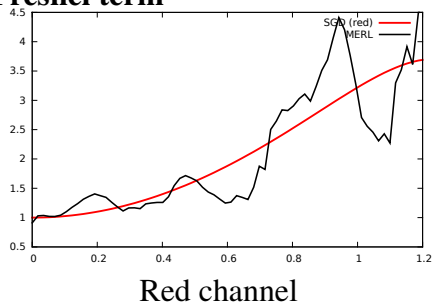
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.60672	1.12717e-07	47.783	0.205635
Green	2.97371	1.06401e-07	36.2767	0.066289
Blue	2.7827	5.27952e-08	31.6066	-0.0661091

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *alumina-oxide*

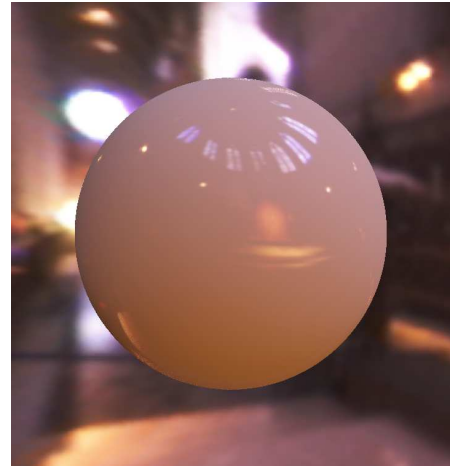
Rendered Images



SGD



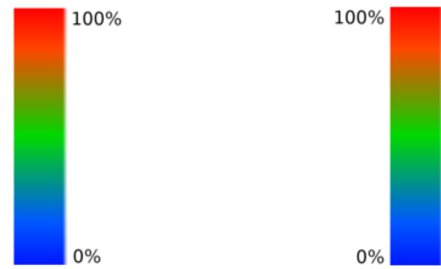
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

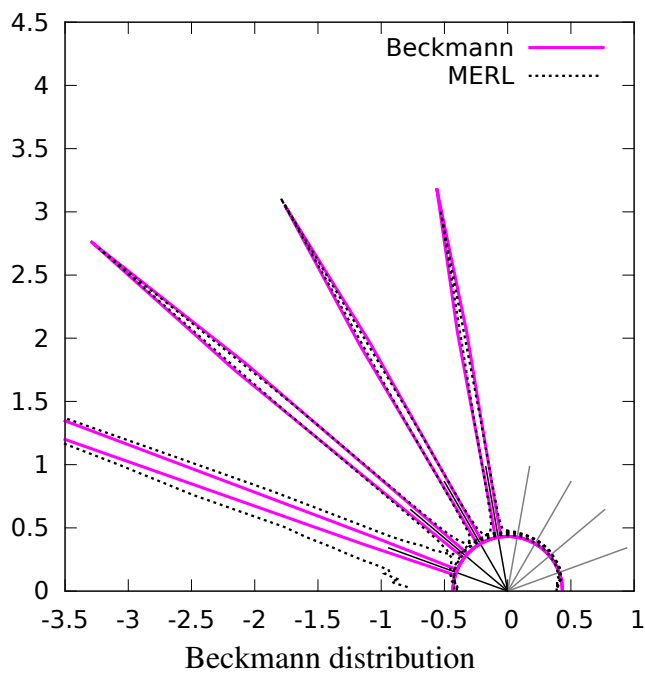
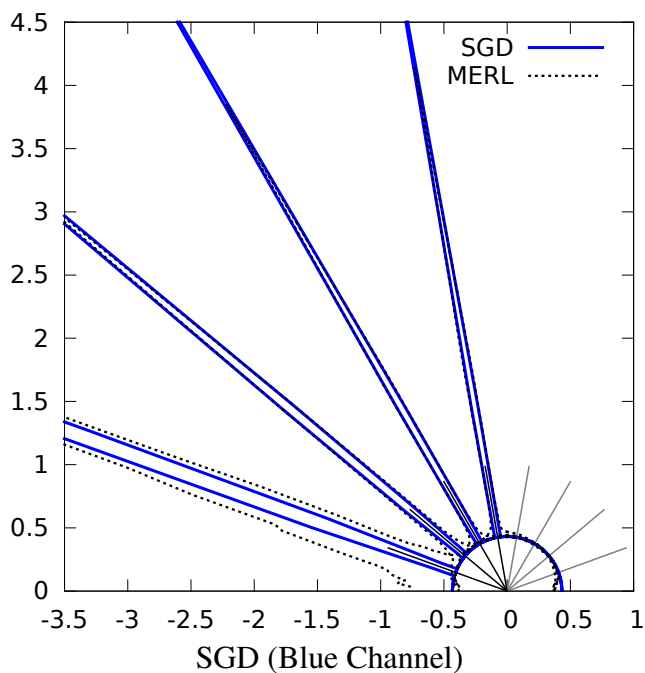
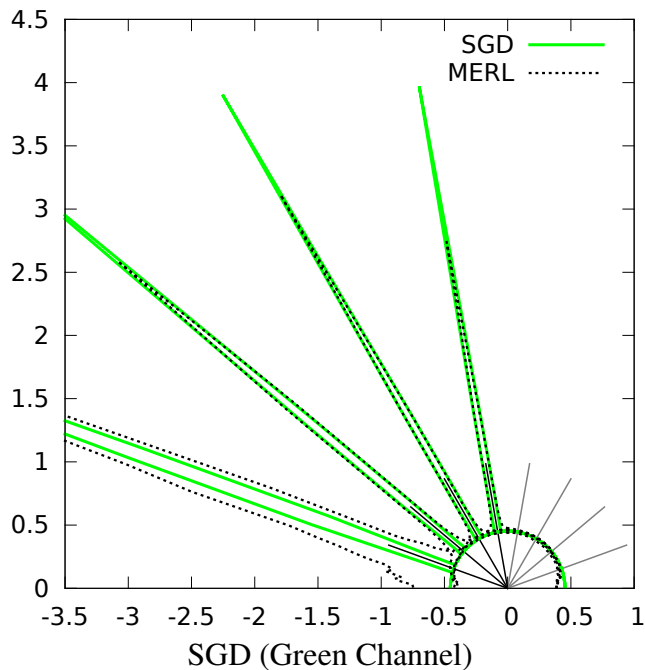
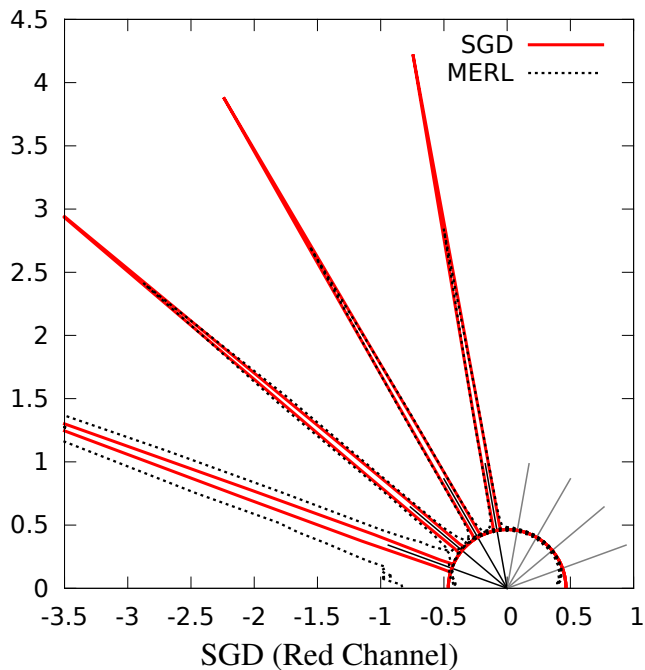
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.316358	0.00863128	0.000159222	0.377727	0.0300766	-0.713784	4381.96	0.213276
Green	0.292248	0.00676832	0.000139421	0.318496	1.70375	0.70375	5413.74	0.147418
Blue	0.25416	0.0103309	0.000117714	0.402598	1.96622	1.16019	5710.42	0.27746

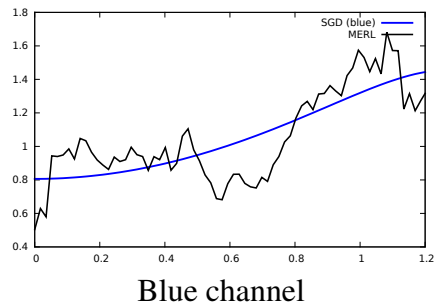
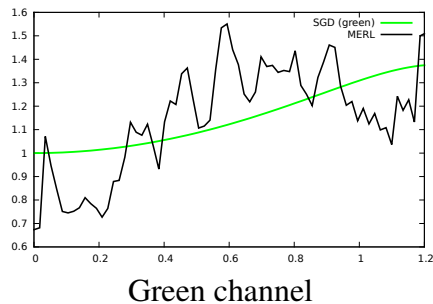
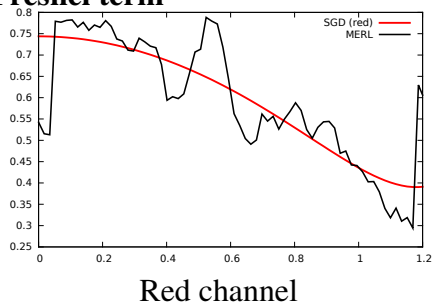
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.31076	6.72897e-08	354.275	0.52701
Green	4.93831	1.15769e-07	367.448	0.531166
Blue	2.84538	6.32199e-08	414.581	0.53301

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *aluminium*

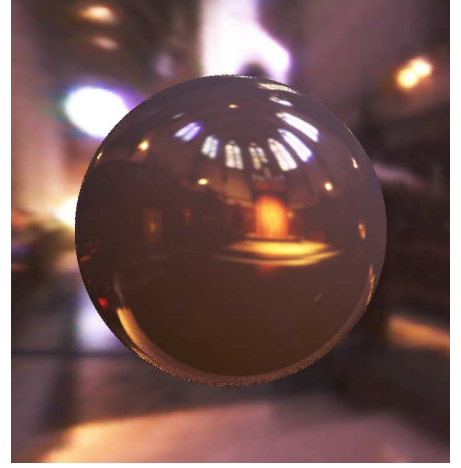
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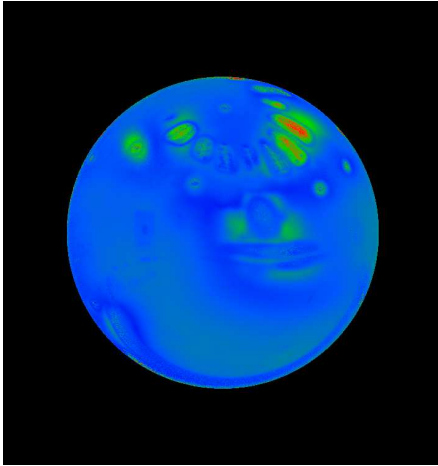
SGD



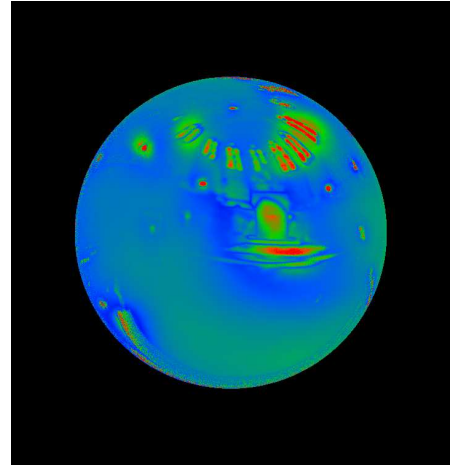
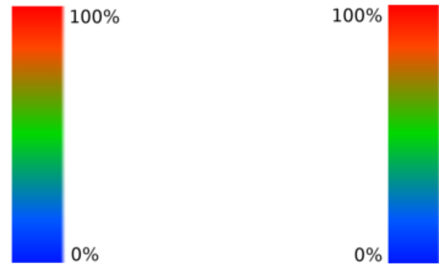
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

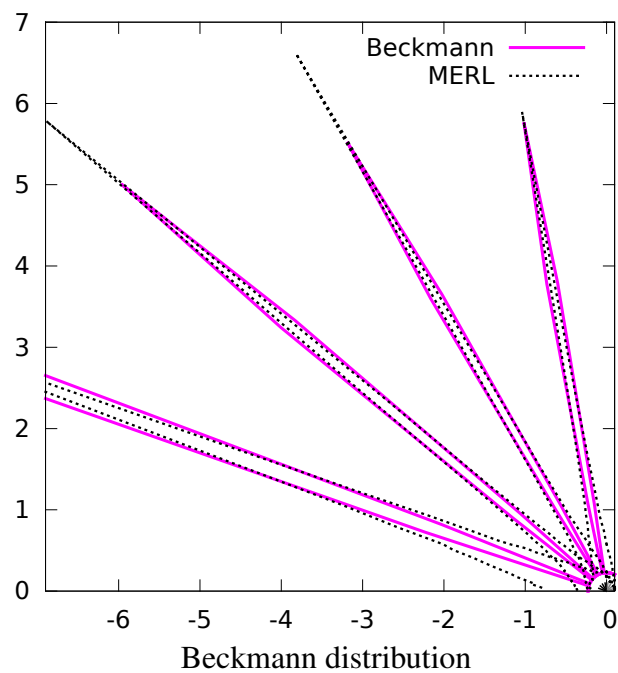
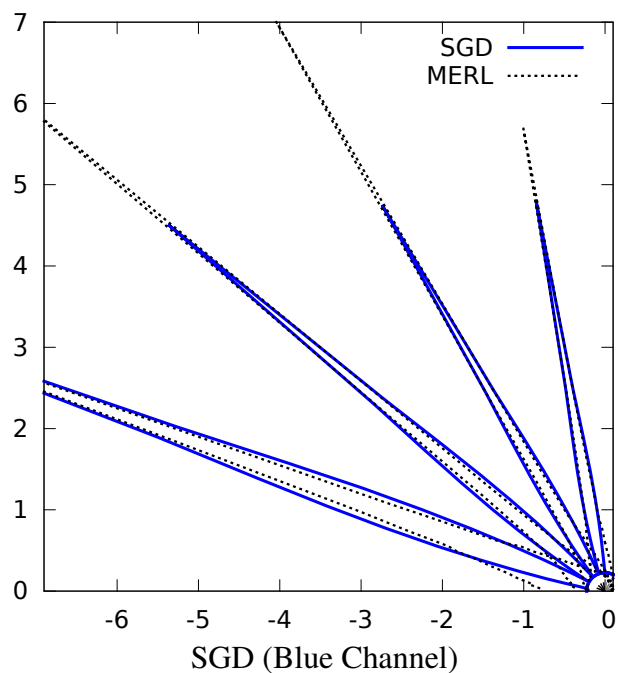
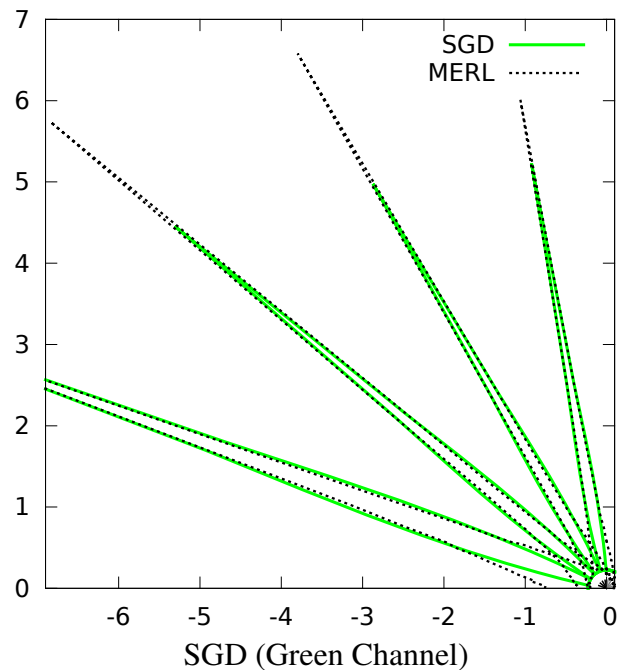
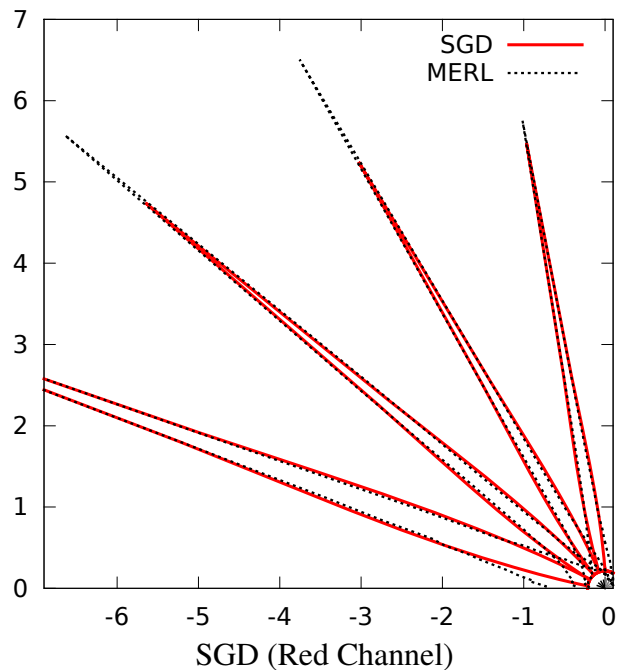
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0305166	0.0999739	0.0012241	0.537669	0.977854	-0.0221457	449.321	0.303567
Green	0.0358788	0.131797	0.000926487	0.474562	0.503108	-0.0995445	658.044	0.232628
Blue	0.0363463	0.0830361	0.000991844	0.435936	1.77905	0.77905	653.86	0.441578

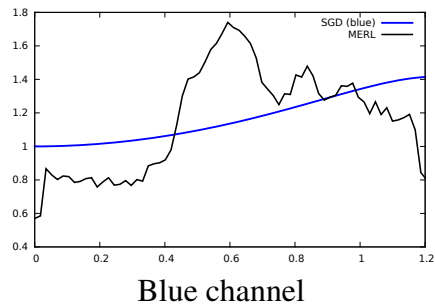
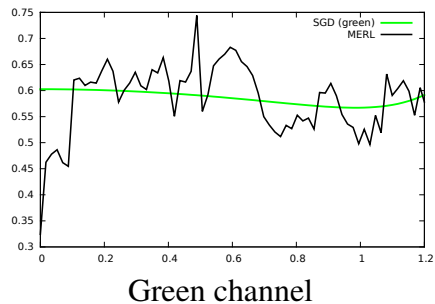
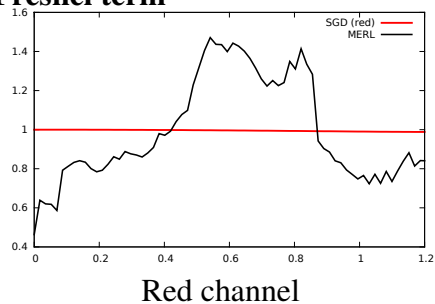
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	8.2832e-07	3.54592e-07	23.8656	-0.510356
Green	9.94692e-08	16.0175	10.6911	0.570179
Blue	6.11887e-08	15.88	9.69801	0.566156

BRDF lobes in the incidence plane (Cubic root applied)

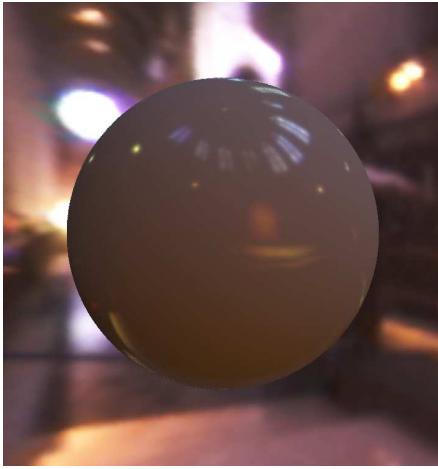


Fresnel term

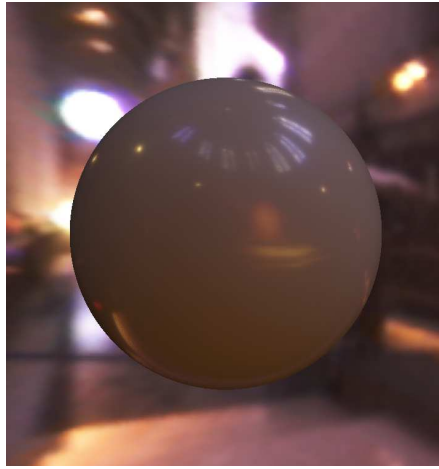


Material Name: *aventurnine*

Rendered Images



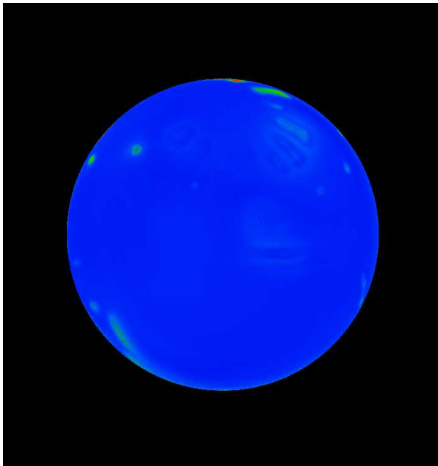
SGD



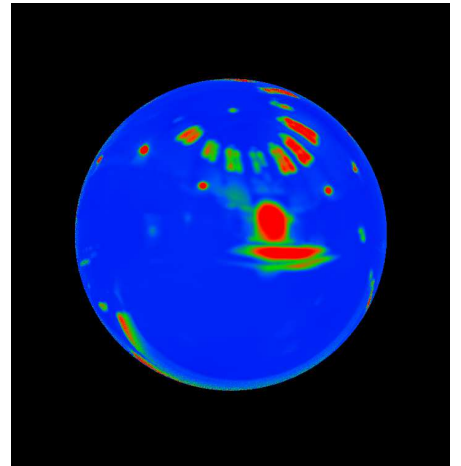
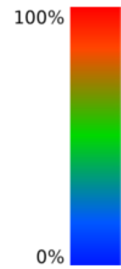
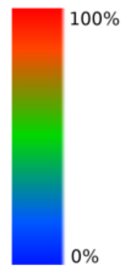
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

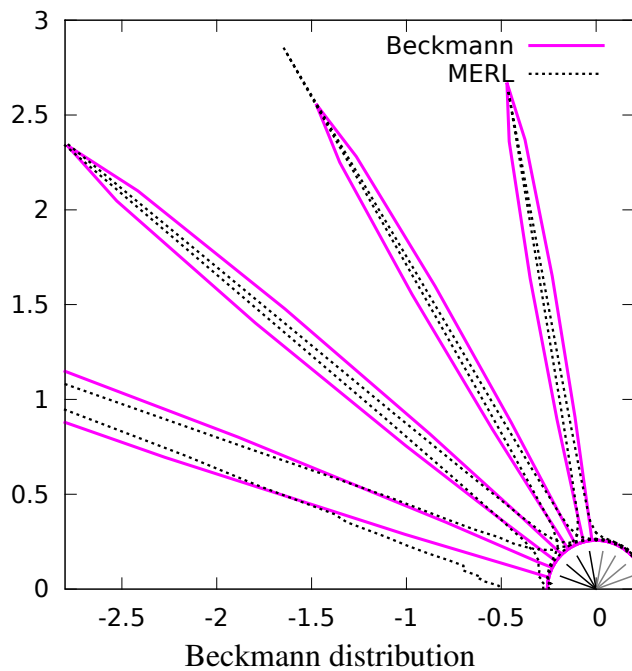
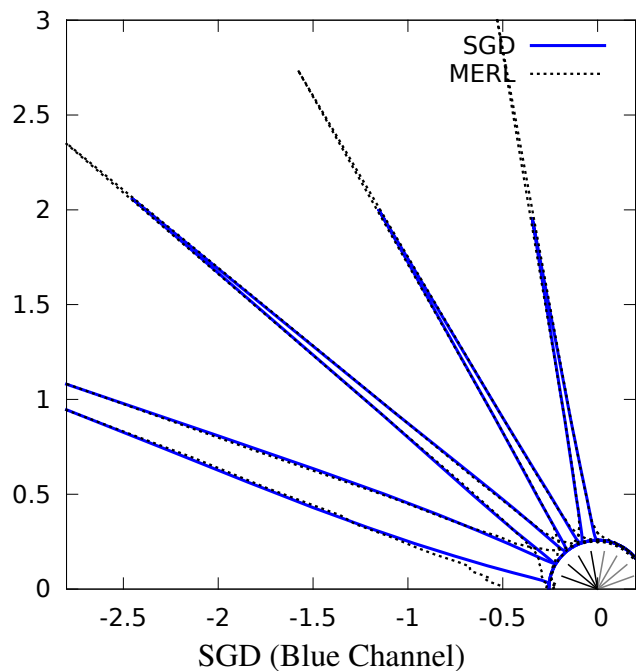
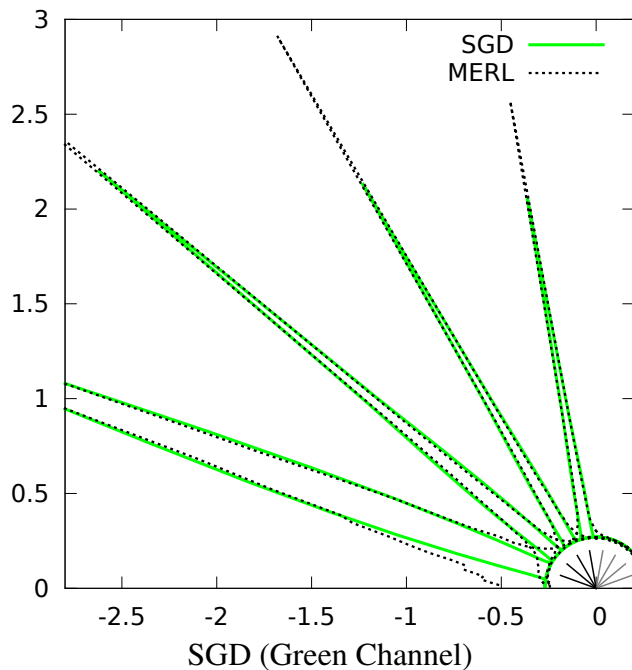
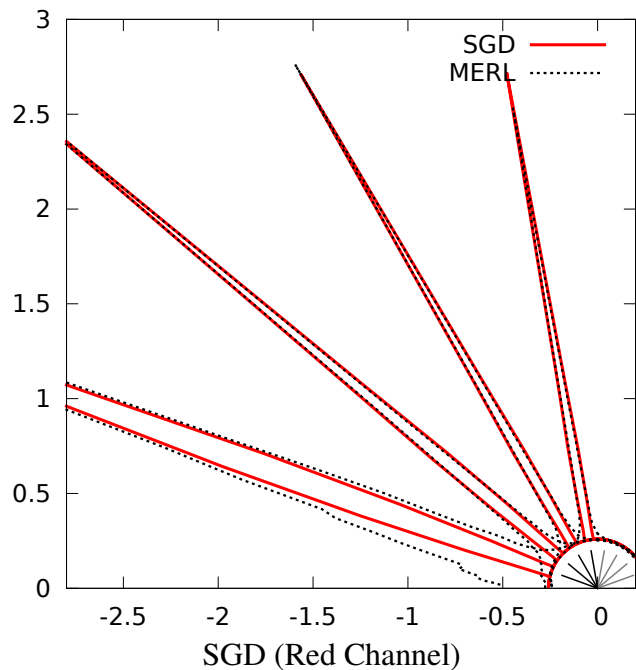
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0548217	0.0348169	0.000328039	0.387167	0.252033	0.130593	2104.51	0.0359759
Green	0.0621179	0.0872381	0.000856166	0.504525	0.133897	0.0930416	676.157	0.0297523
Blue	0.0537826	0.111961	0.00145342	0.652122	0.087172	0.0567429	303.59	0.0285881

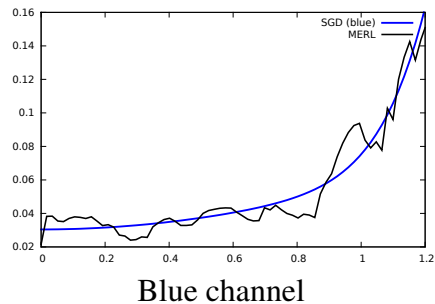
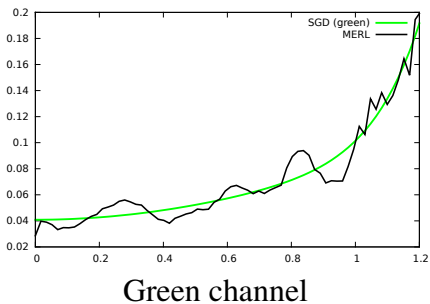
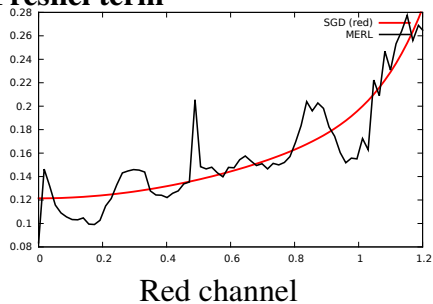
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.12126	1.03849e-07	251.265	0.510125
Green	2.50965e-07	8.53824e-07	24.2886	-0.41764
Blue	2.45778e-05	3.20722e-07	29.0236	-0.245097

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *beige-fabric*

Rendered Images



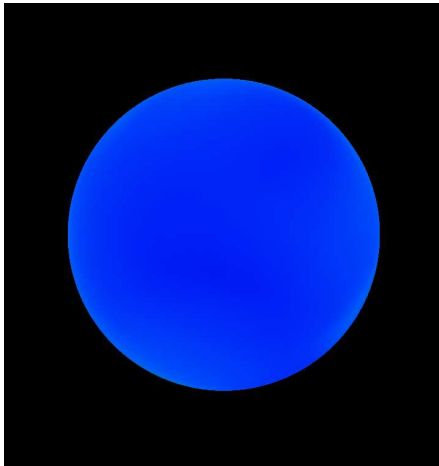
SGD



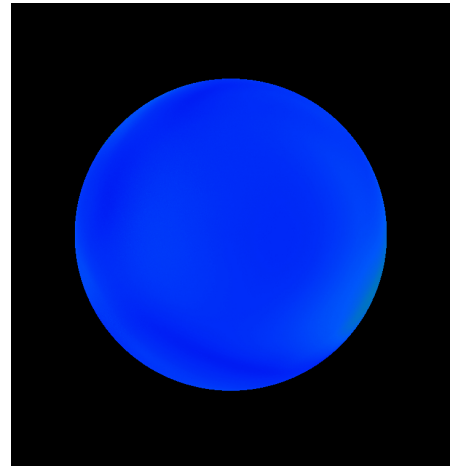
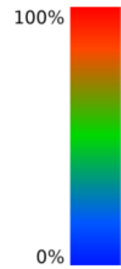
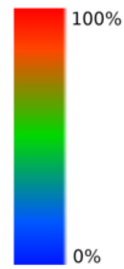
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

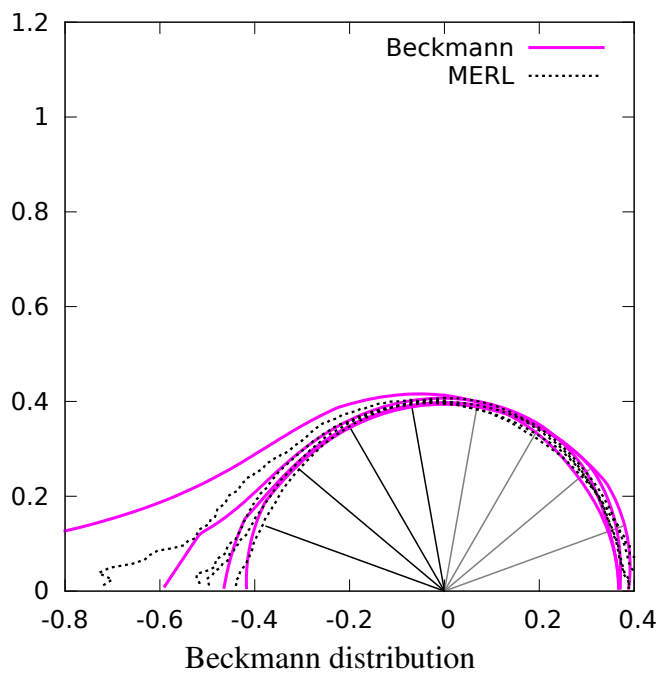
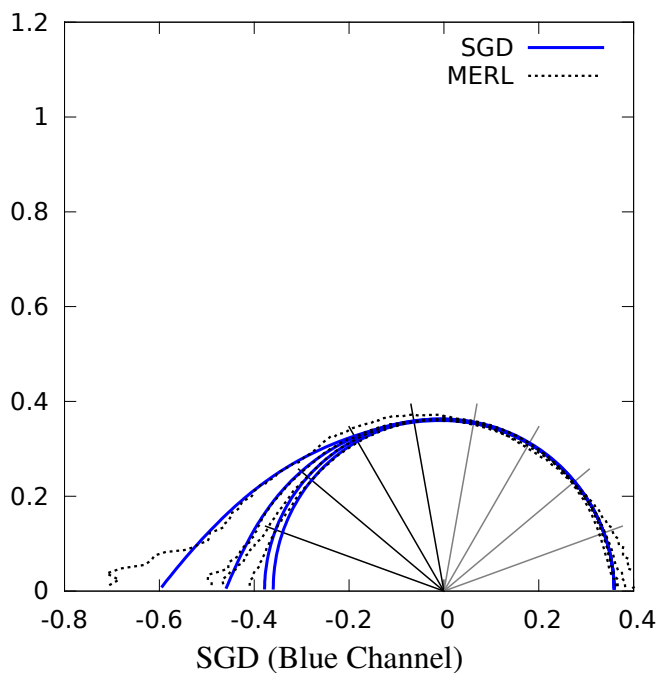
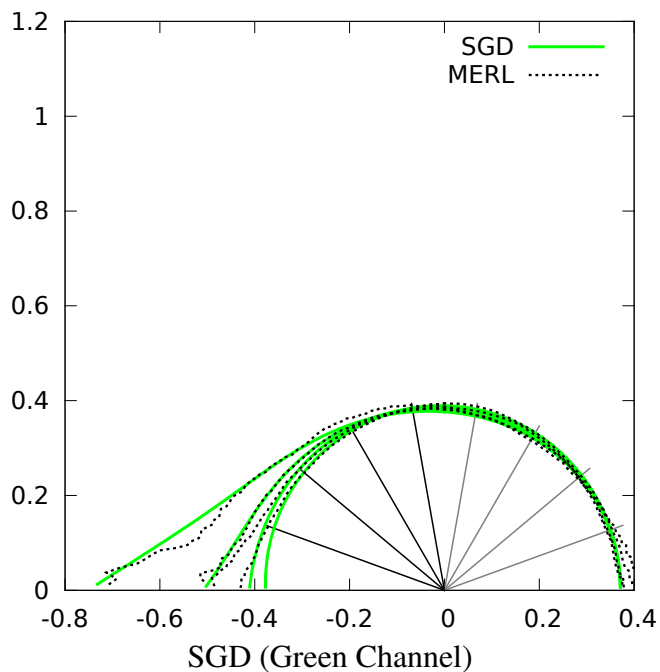
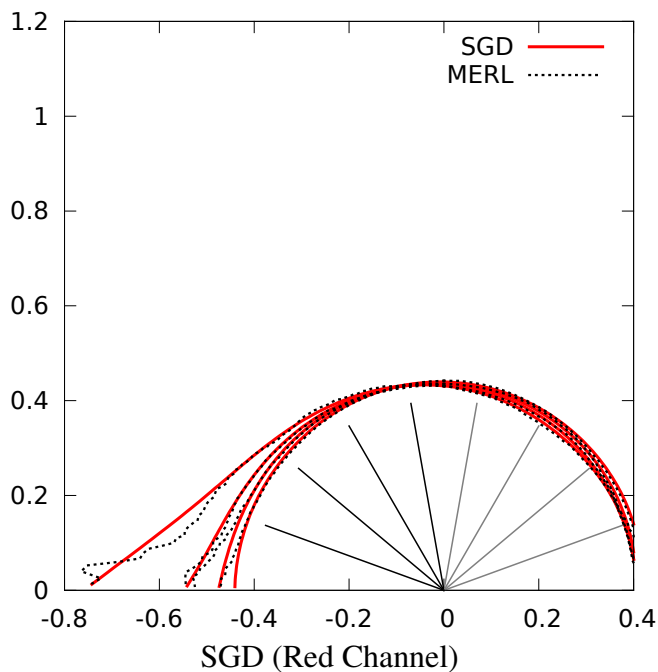
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.20926	0.121663	0.39455	0.474725	0.0559459	-0.318718	3.8249	0.00217528
Green	0.160666	0.0501577	0.15975	0.0144728	0.222268	-0.023826	7.32453	0.00195262
Blue	0.145337	0.00177279	0.110706	1.70871e-12	8.4764	7.4764	10.0904	0.00171008

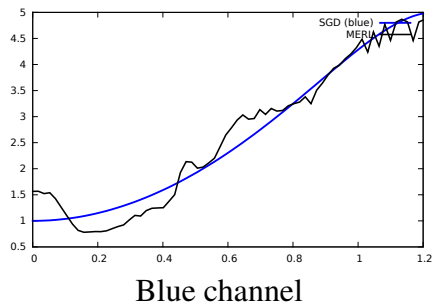
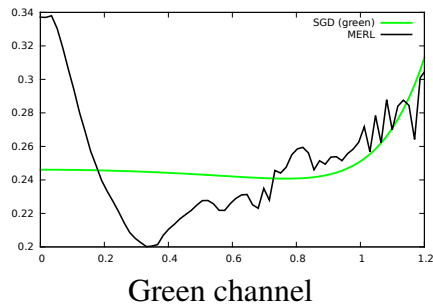
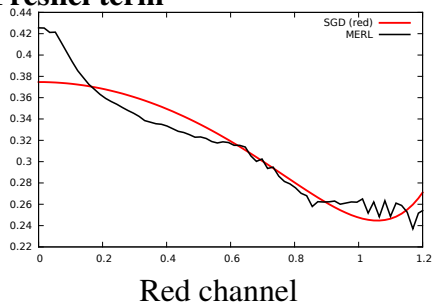
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.26283	0.0375346	7.52635	0.217453
Green	2.97144	0.073481	9.05672	0.407084
Blue	3.55311	0.0740222	10.6185	0.450203

BRDF lobes in the incidence plane (Cubic root applied)

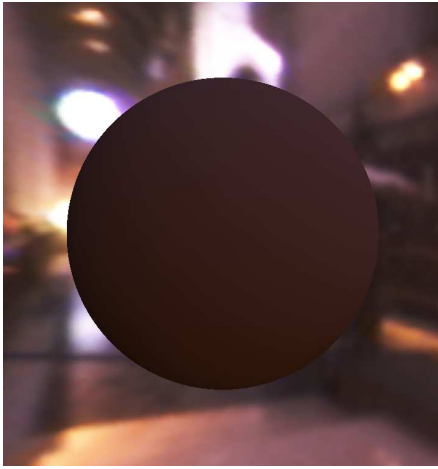


Fresnel term

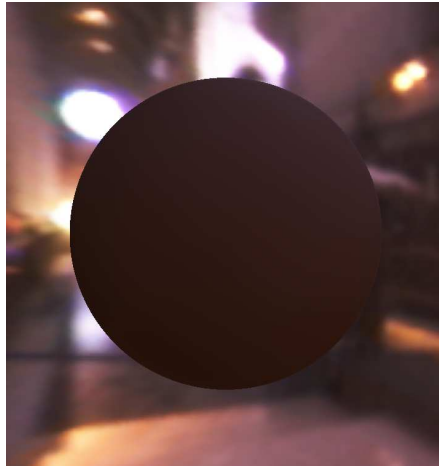


Material Name: *black-fabric*

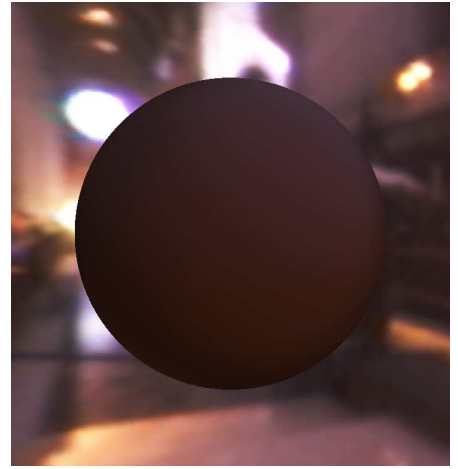
Rendered Images



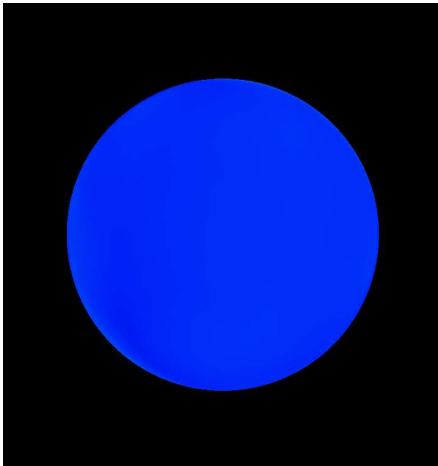
SGD



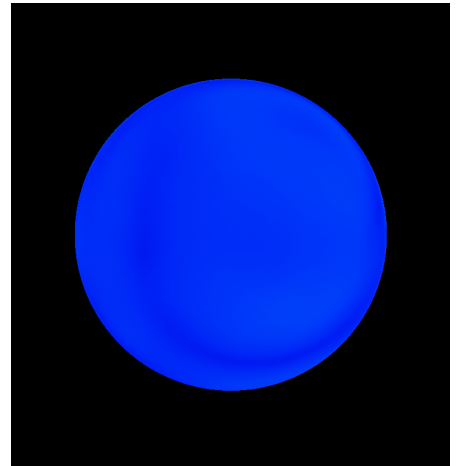
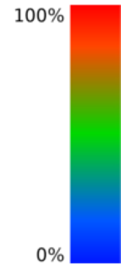
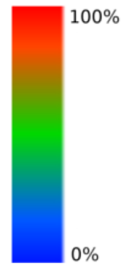
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

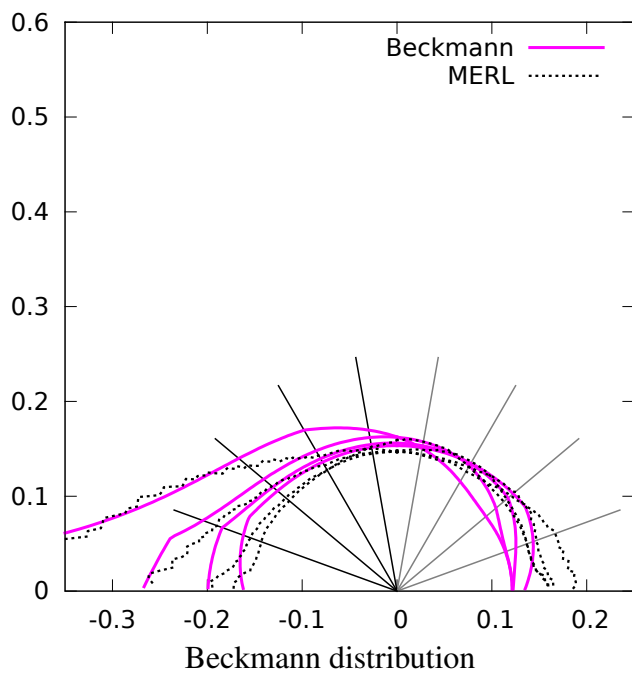
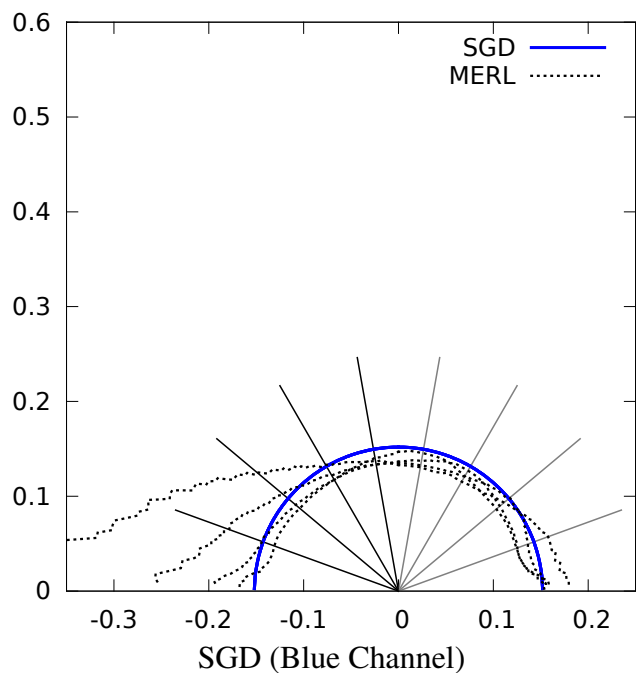
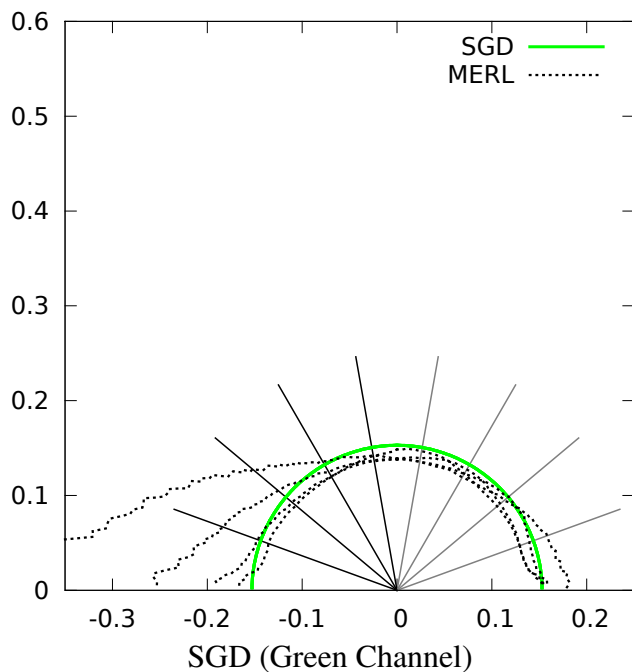
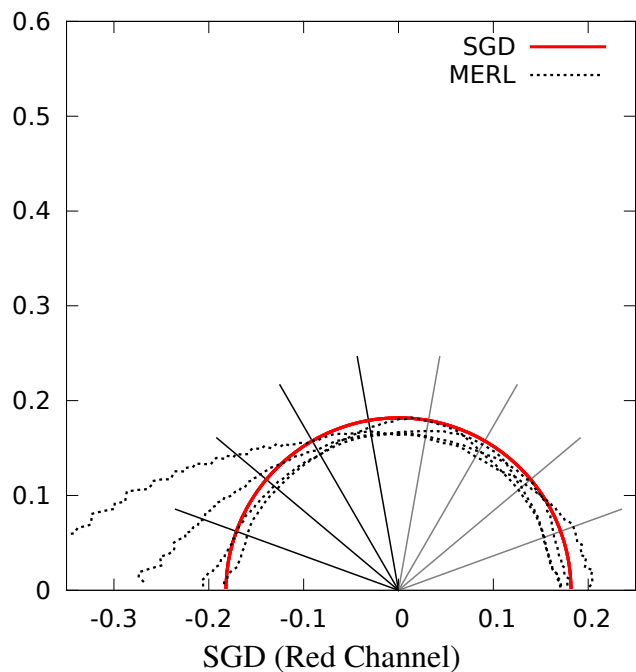
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0189017	2.20654e-16	0.132262	0.189024	1	0	8.1593	0.000363154
Green	0.0112353	6.76197e-15	0.128044	0.18842	1	0	8.38075	0.000272253
Blue	0.0110067	1.57011e-13	0.127838	0.188426	1	0	8.39184	0.000274773

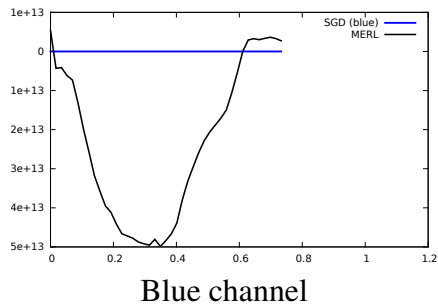
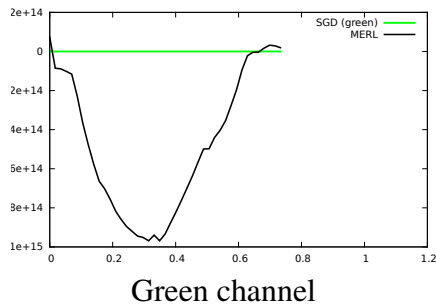
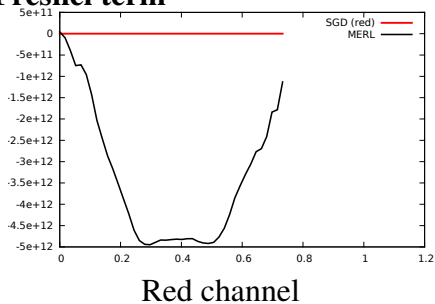
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.83017	0.00415117	12.9974	0.207997
Green	3.89536	0.00368324	13.2597	0.205597
Blue	3.89874	0.00365826	13.2737	0.205424

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *black-obsidian*

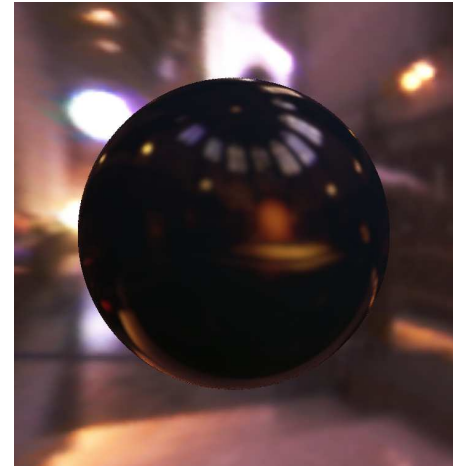
Rendered Images



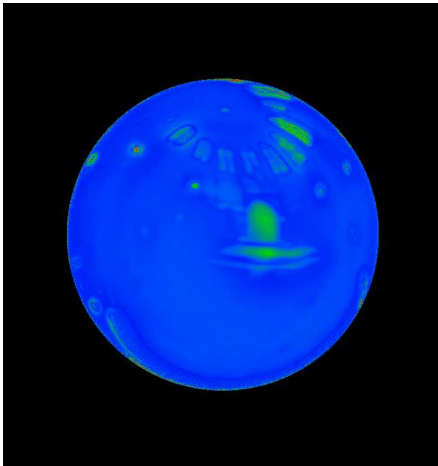
SGD



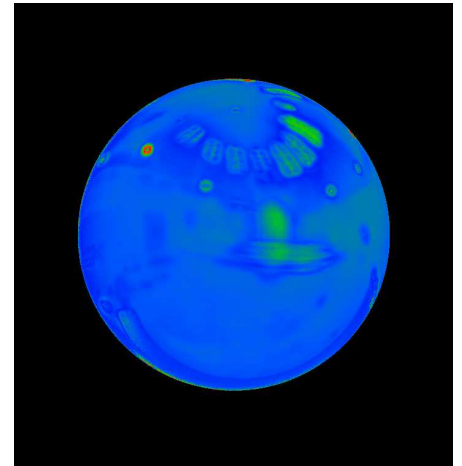
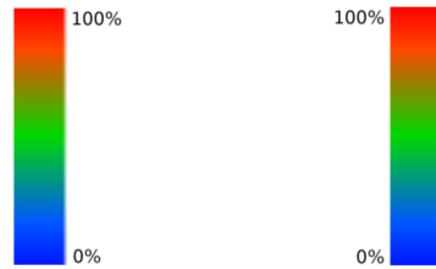
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

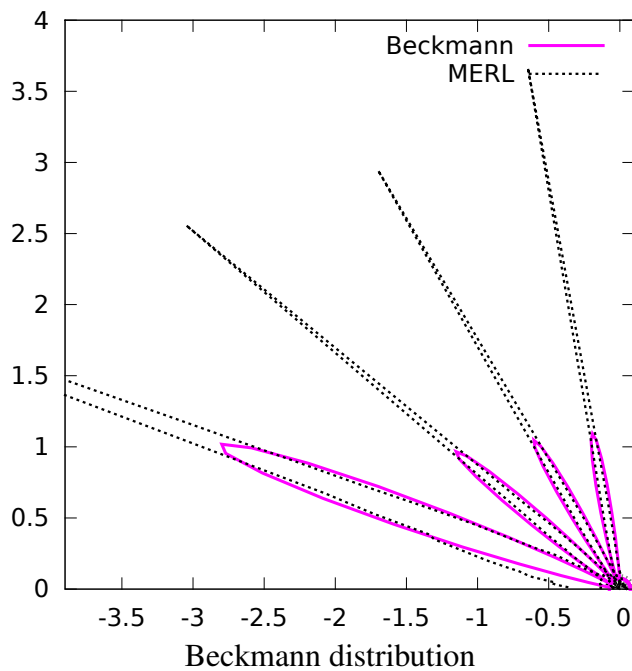
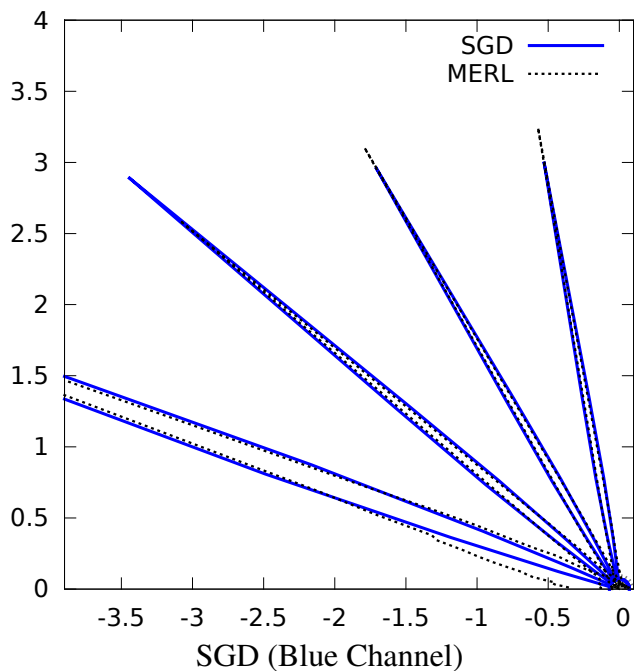
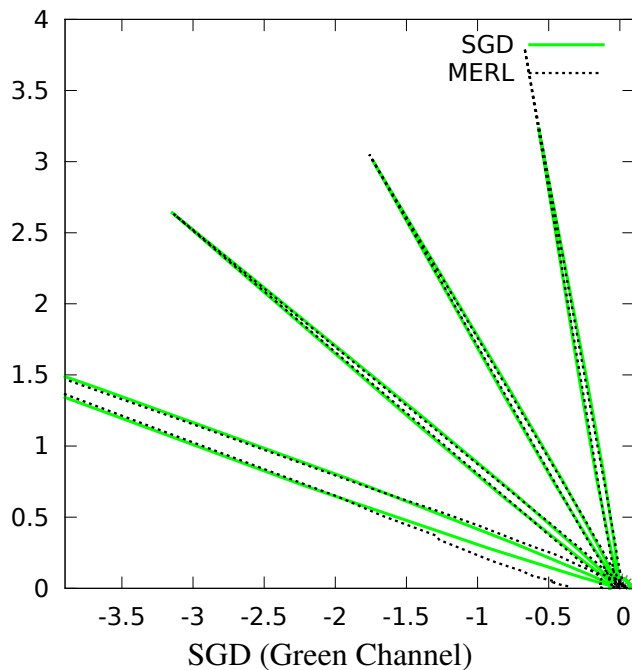
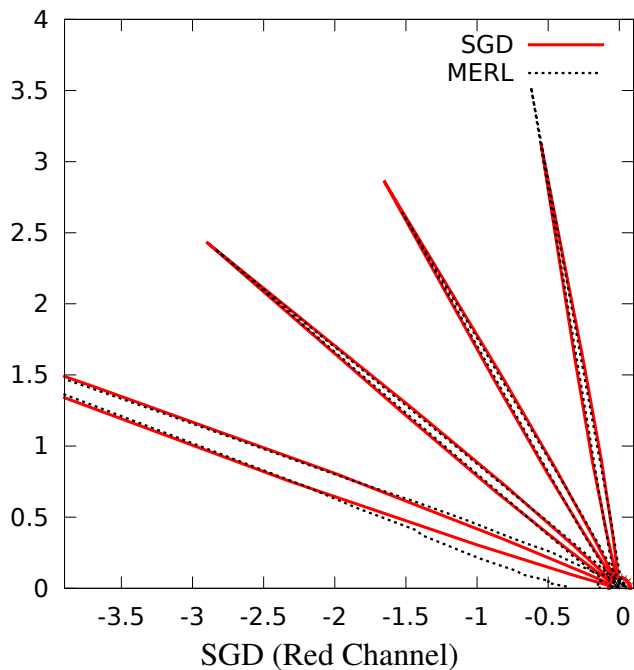
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00130399	0.133029	0.000153649	0.186234	2.42486e-12	-0.0800755	5668.57	0.0841374
Green	0.0011376	0.125362	0.000148939	0.227495	0.0174133	-0.048671	5617.79	0.0943085
Blue	0.00107233	0.126188	0.000179285	0.25745	0.091766	0.0406445	4522.84	0.123514

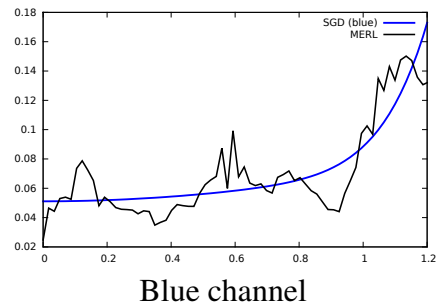
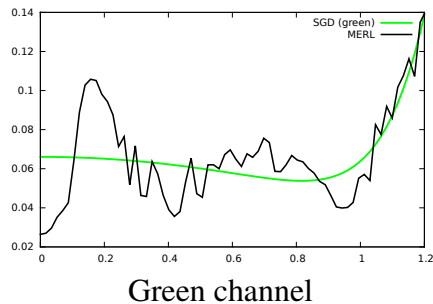
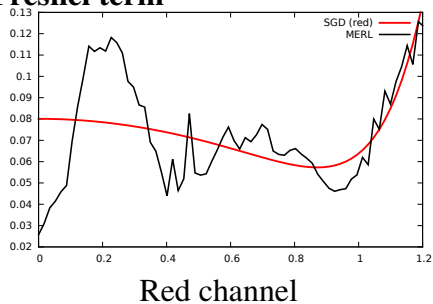
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	13.7614	1.31522e+49	117.224	1.19829
Green	8.59526	9.46657e+50	120.912	1.19885
Blue	6.44667	1.03557e+47	113.366	1.19248

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *black-oxidized-steel*

Rendered Images



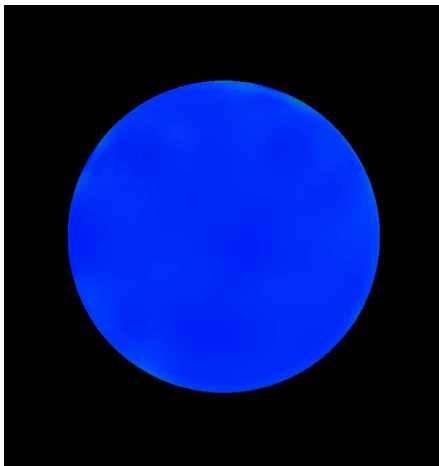
SGD



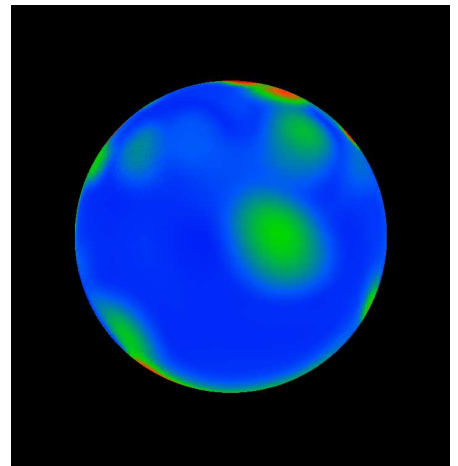
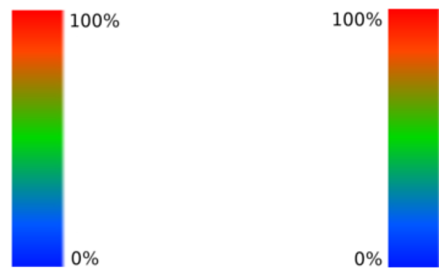
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

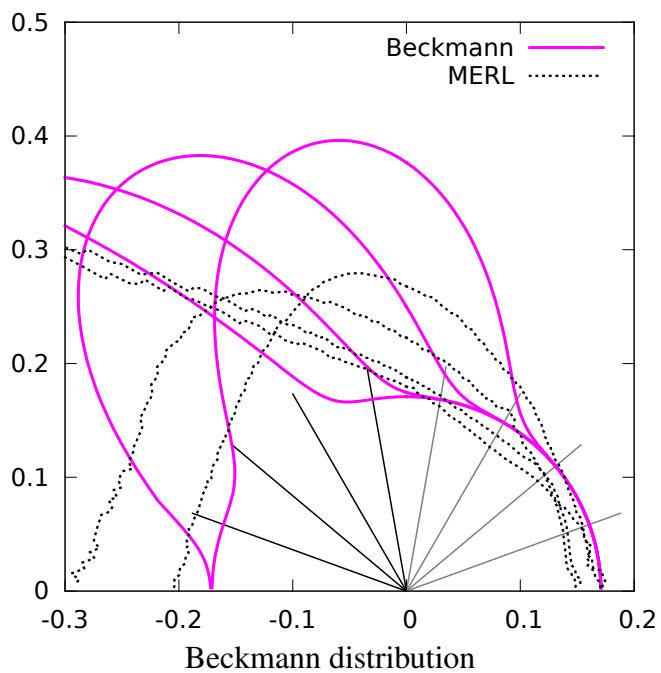
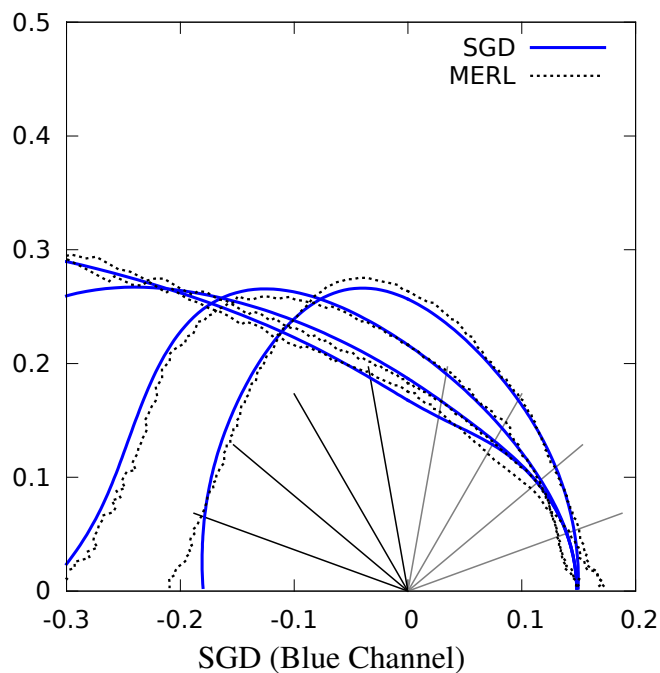
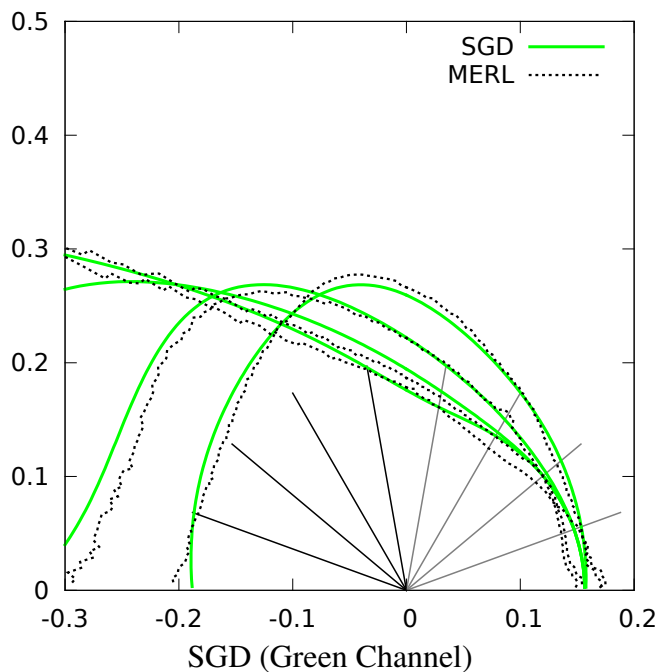
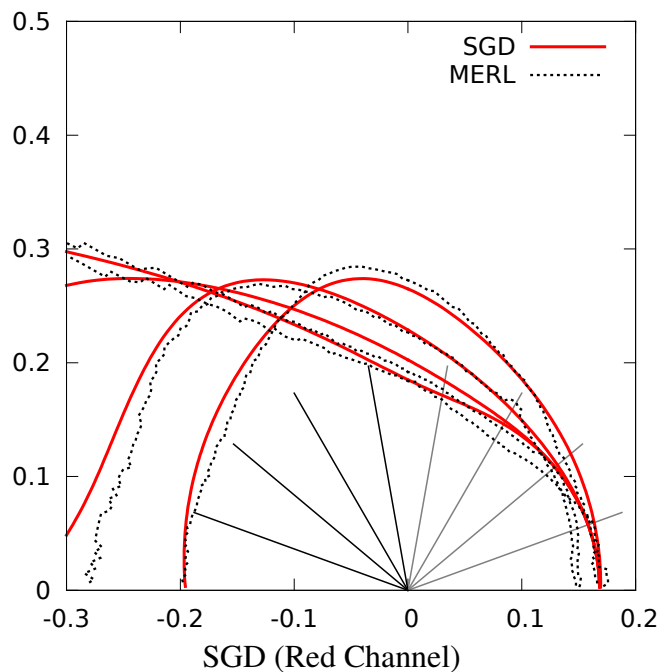
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0149963	0.373438	0.187621	0.661367	0.0794166	0.0470402	5.1496	0.00129576
Green	0.0120489	0.344382	0.195704	0.706913	0.086518	0.0517633	4.91636	0.0011378
Blue	0.0102471	0.329202	0.200503	0.772267	0.080815	0.0455037	4.69009	0.000986163

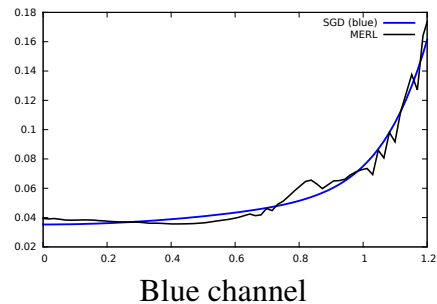
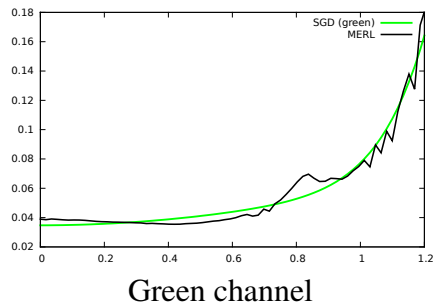
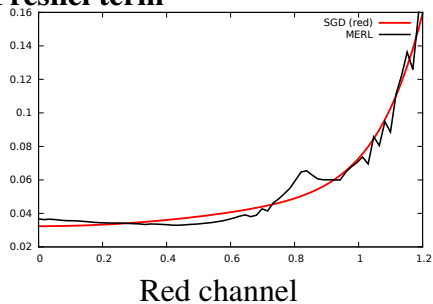
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.0681	1.07364e-07	20.2383	-0.479617
Green	3.95489	1.05341e-07	20.1786	-0.4885
Blue	3.71052	1.16556e-07	20.2553	-0.478388

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *black-phenolic*

Rendered Images



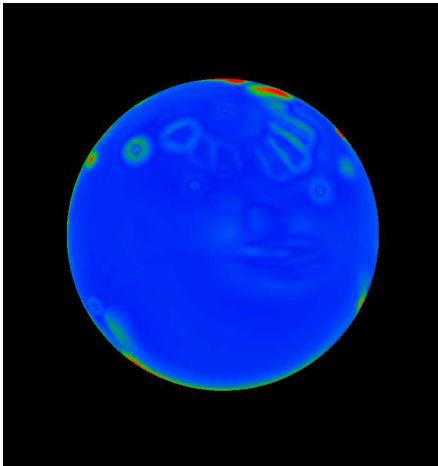
SGD



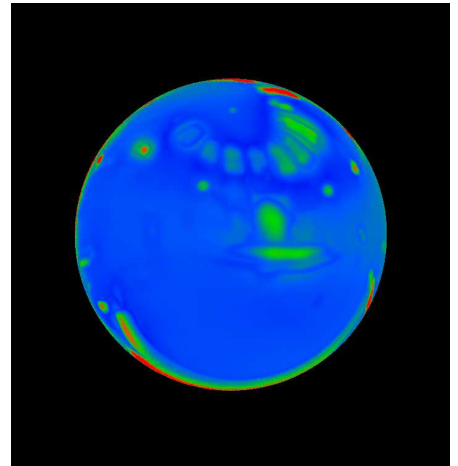
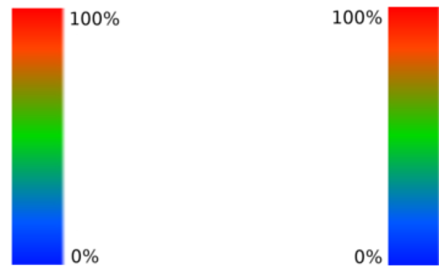
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

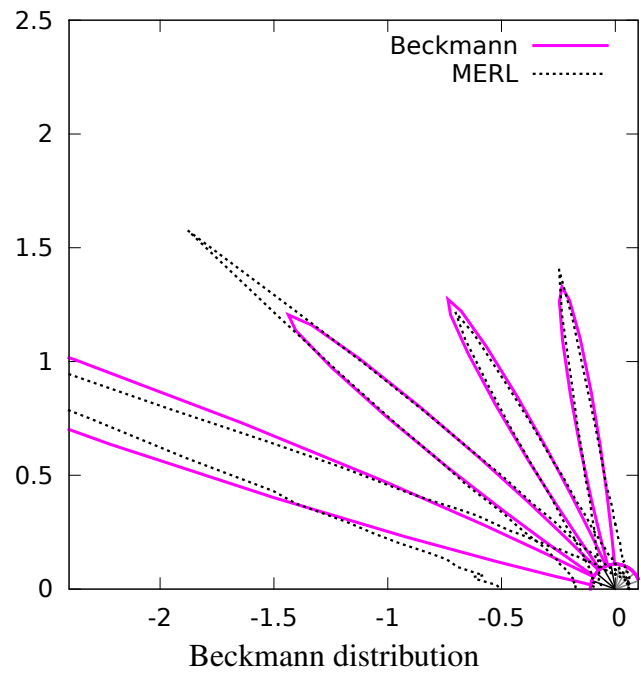
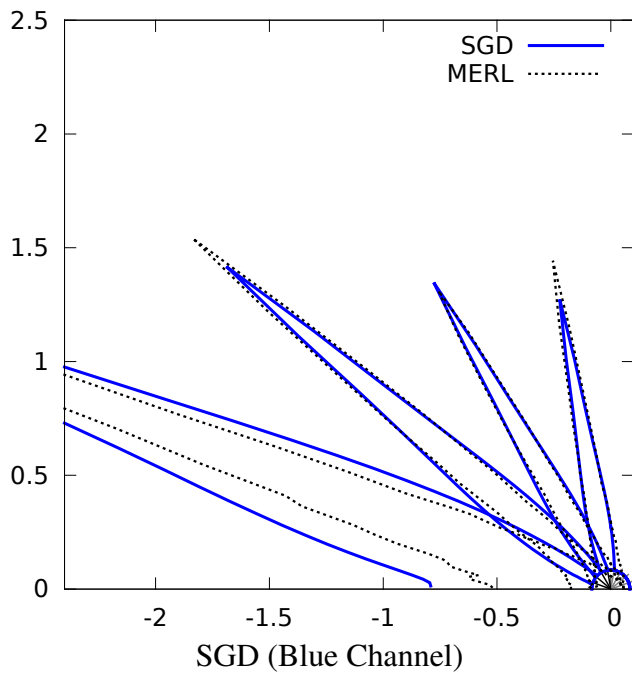
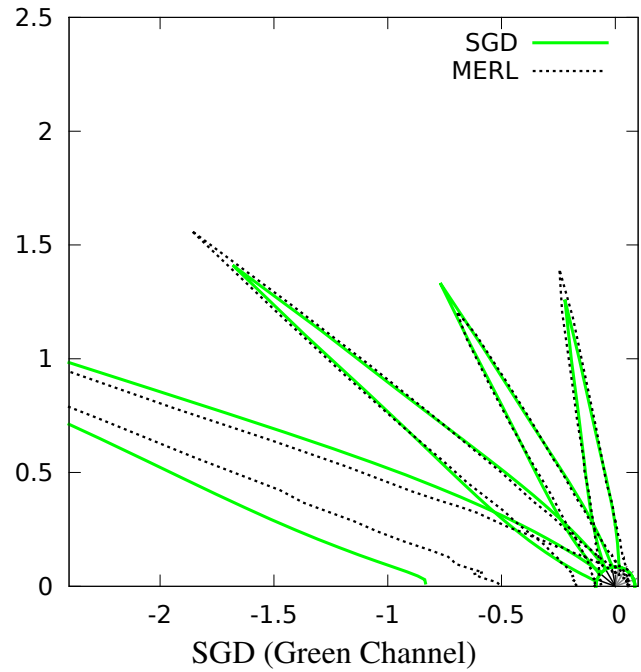
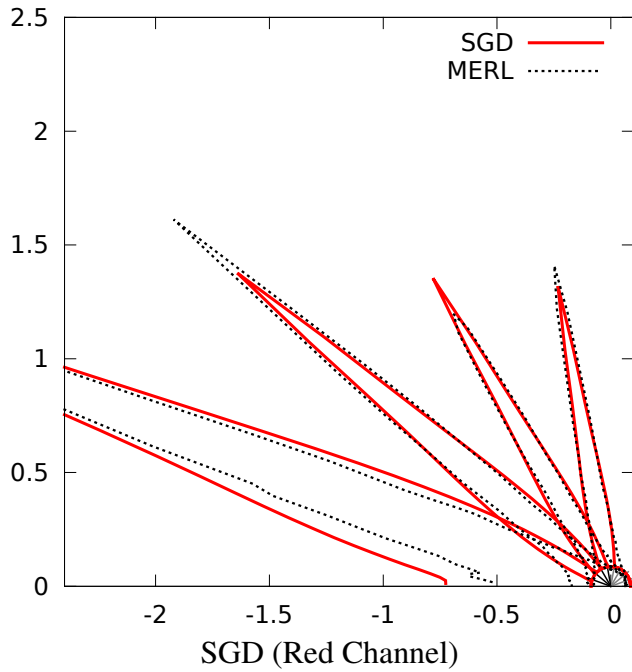
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00204717	0.177761	0.00670804	0.706648	0.16777	0.111447	65.4189	0.0307129
Green	0.00196935	0.293146	0.00652009	0.677776	0.12335	0.0927321	70.8936	0.0531183
Blue	0.00182908	0.230592	0.00656043	0.673986	0.166663	0.125663	70.9951	0.0454238

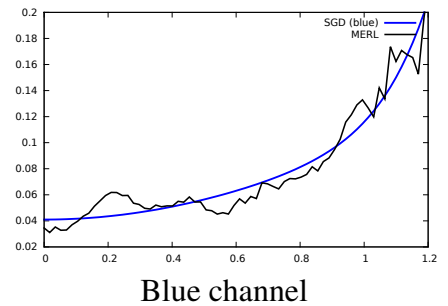
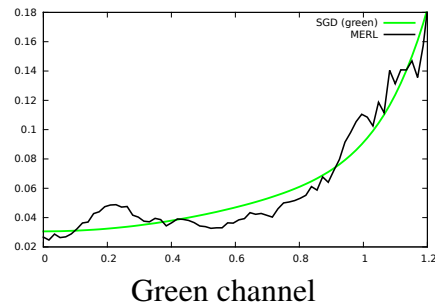
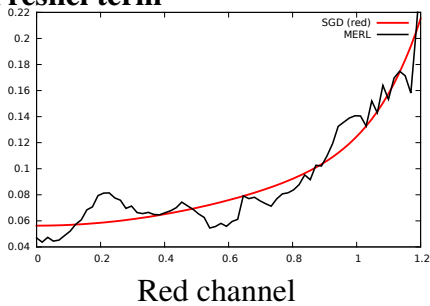
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.06318	1.24286e-07	74.0711	0.338204
Green	1.15283	3.00039e-08	75.1165	0.319306
Blue	1.16529	9.77334e-08	73.792	0.33434

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

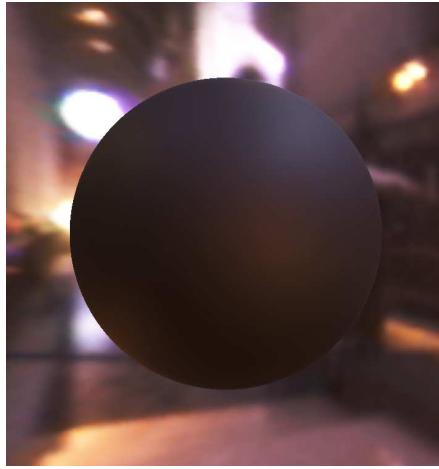


Material Name: *black-soft-plastic*

Rendered Images



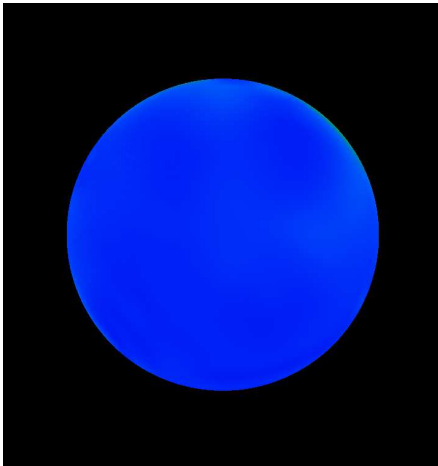
SGD



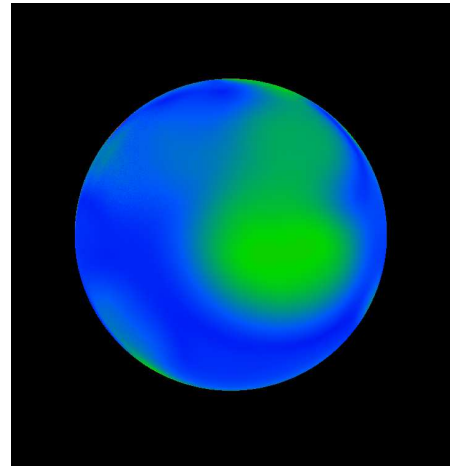
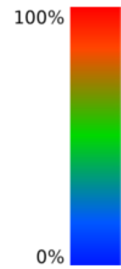
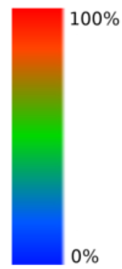
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

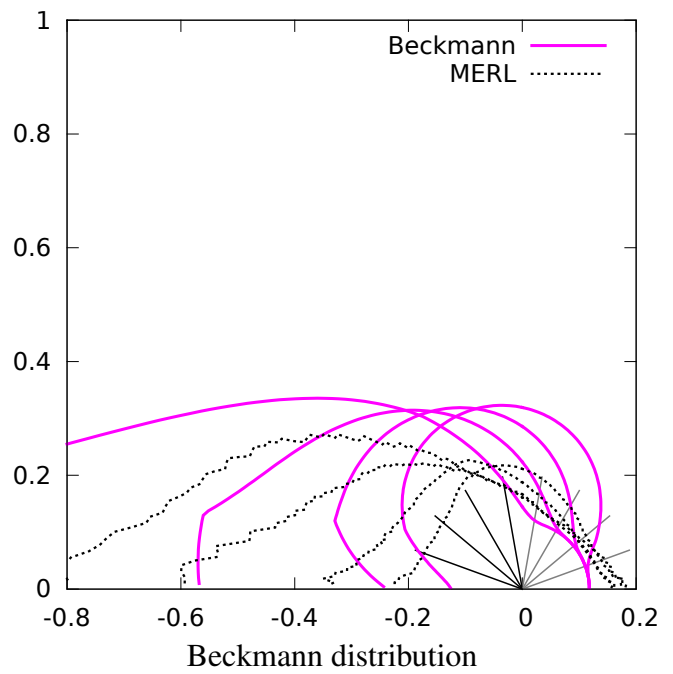
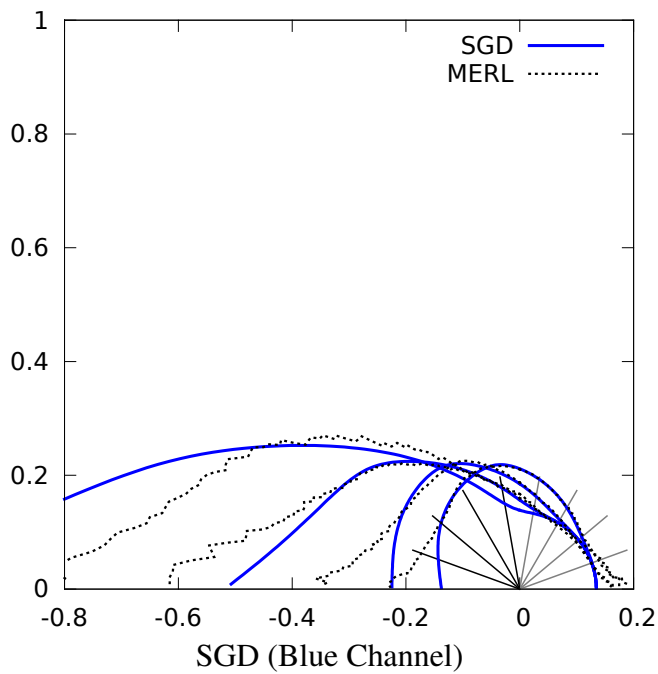
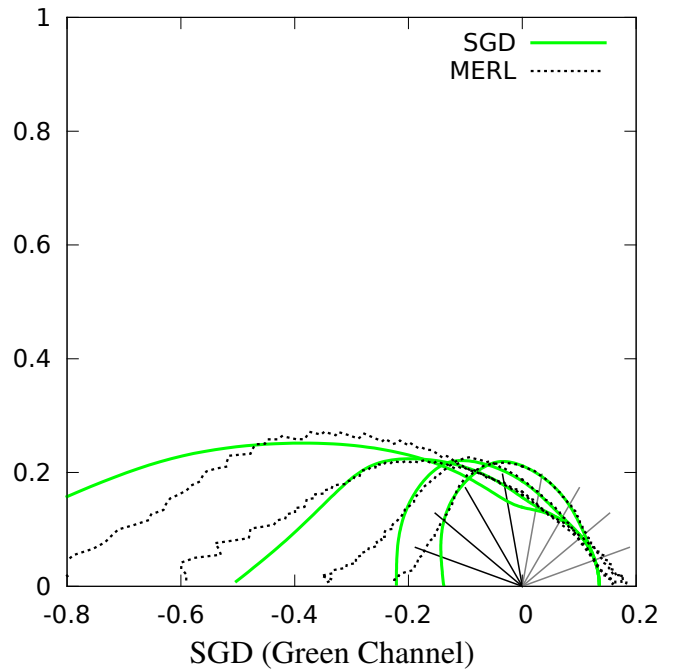
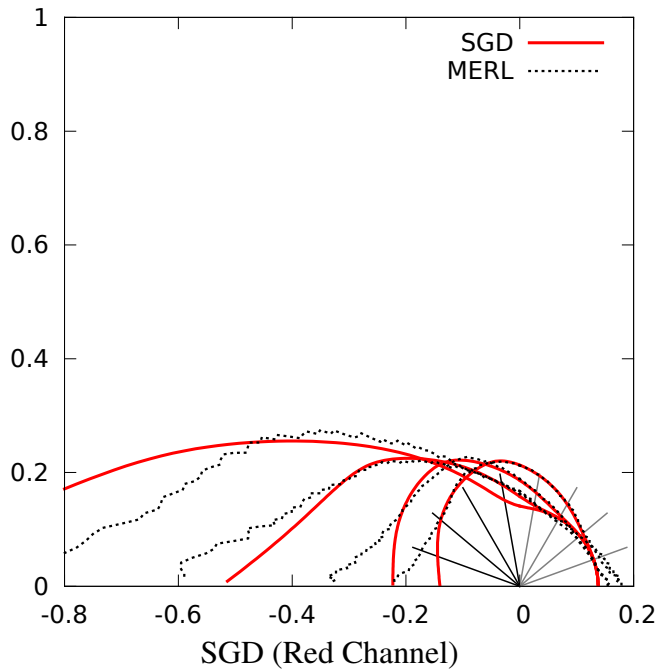
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00820133	0.110657	0.0926904	0.14163	0.150251	0.100065	11.2419	0.000527402
Green	0.00777718	0.0980322	0.0935964	0.148703	0.169418	0.113089	11.113	0.000550255
Blue	0.00764537	0.100579	0.0949975	0.143694	0.170457	0.114468	10.993	0.000527718

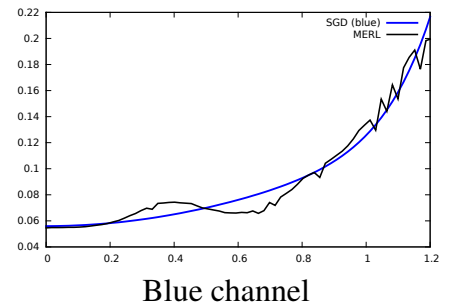
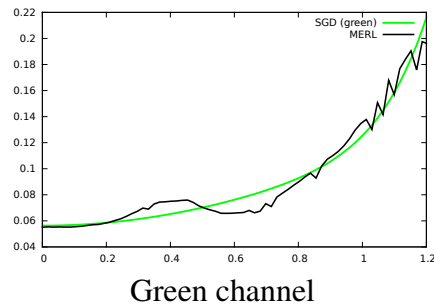
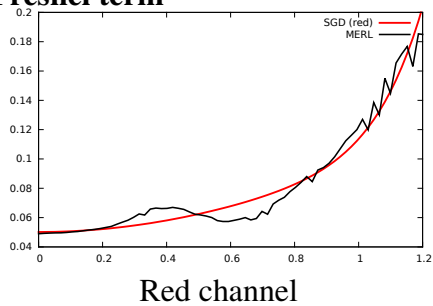
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.3545	0.00464641	14.6751	0.275651
Green	4.3655	0.00384785	14.8089	0.262317
Blue	4.31586	0.0046145	14.5436	0.271284

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *blue-acrylic*

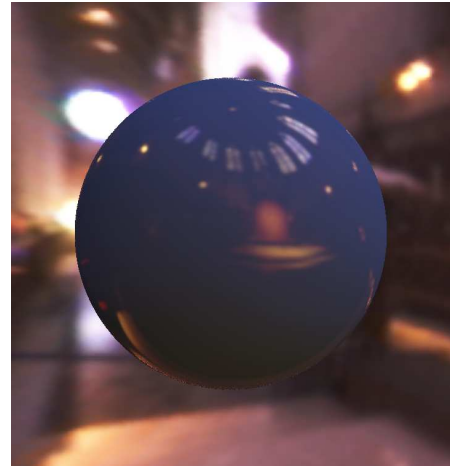
Rendered Images



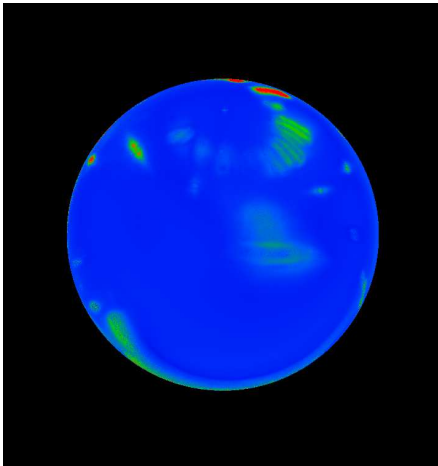
SGD



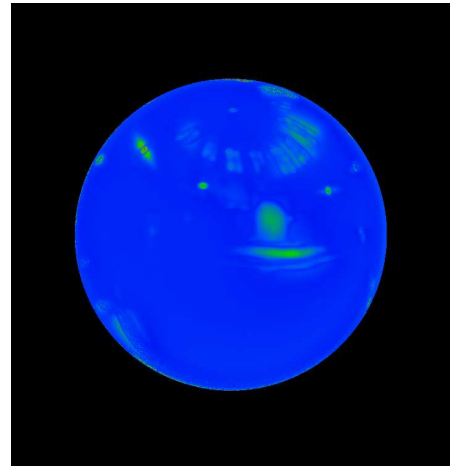
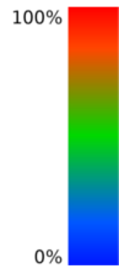
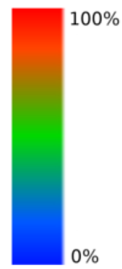
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

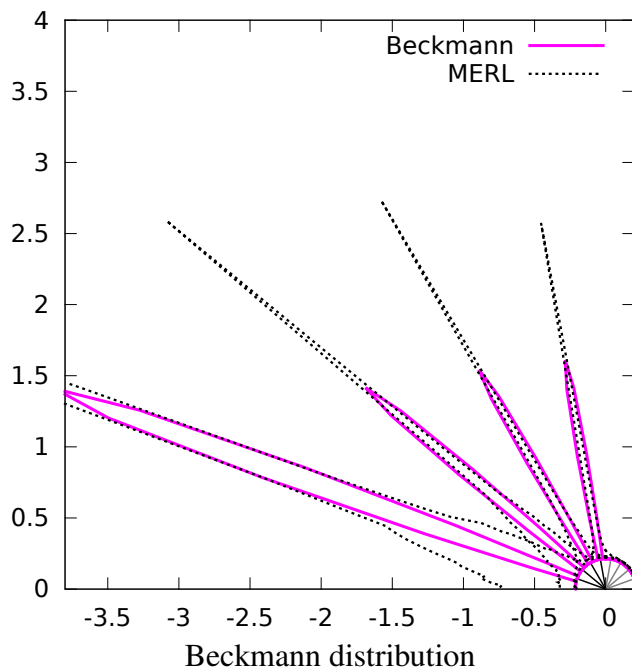
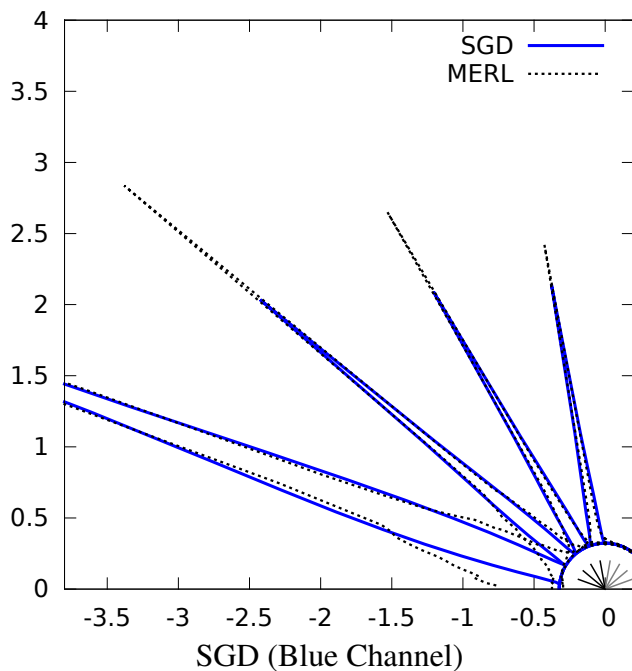
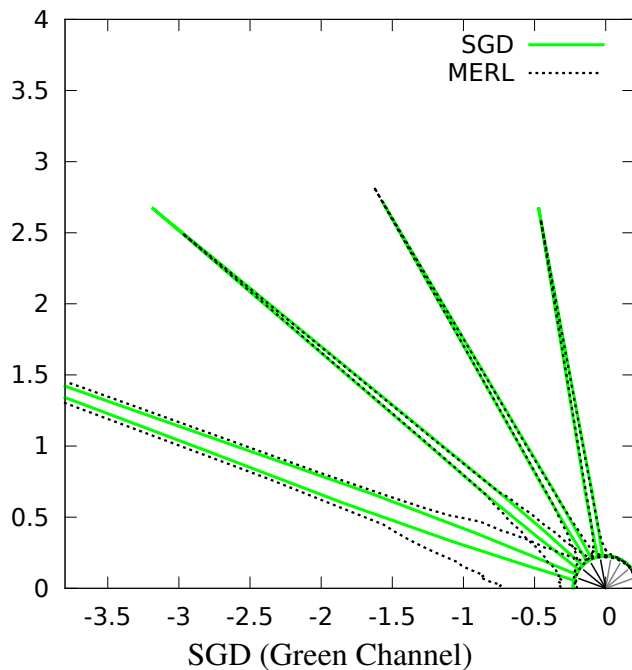
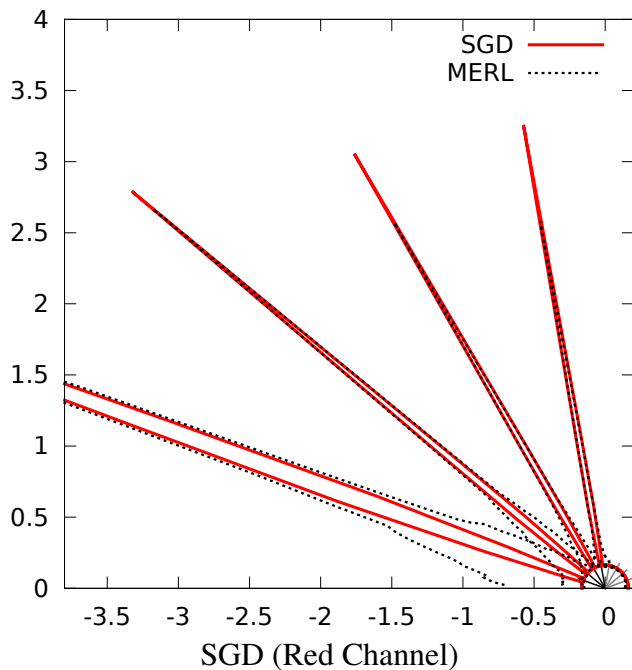
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0134885	0.0864901	0.000174482	0.373948	0.0185562	-0.0209713	4021.24	0.0612235
Green	0.0373766	0.0228191	0.000269795	0.362425	0.399982	0.241543	2646.36	0.0789826
Blue	0.10539	0.204042	0.0015211	0.563636	0.0525861	0.0169474	346.898	0.0461093

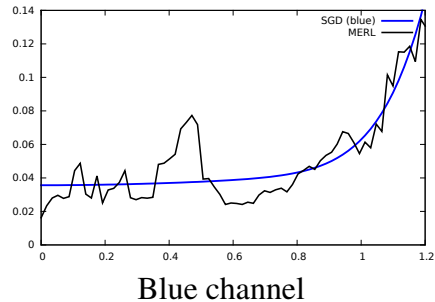
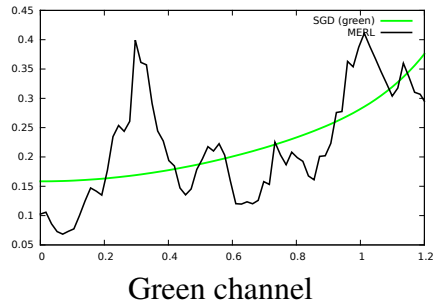
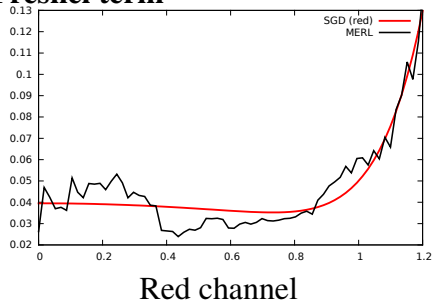
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.38722	9.64334e-08	338.073	0.526039
Green	3.62885	9.96105e-08	272.828	0.515404
Blue	1.83684e-06	3.61787e-07	23.5039	-0.526935

BRDF lobes in the incidence plane (Cubic root applied)

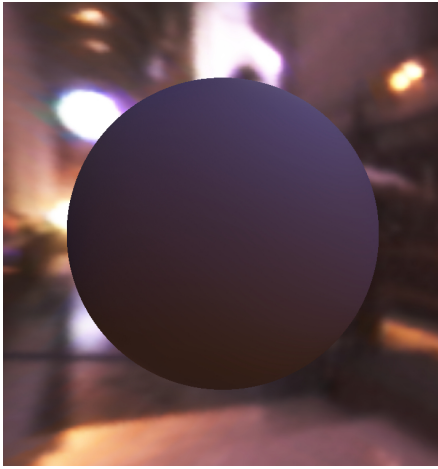


Fresnel term

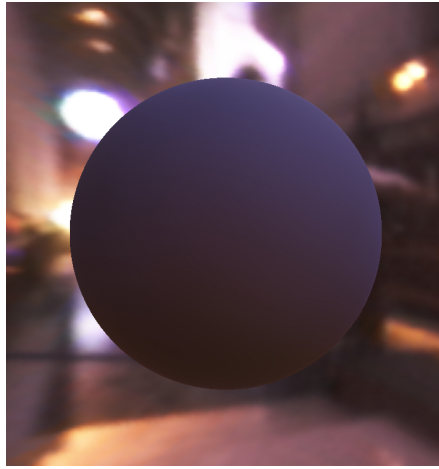


Material Name: *blue-fabric*

Rendered Images



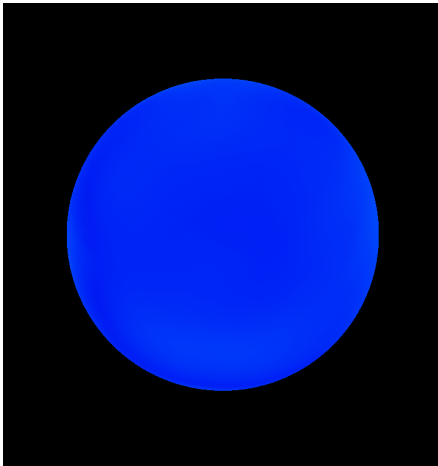
SGD



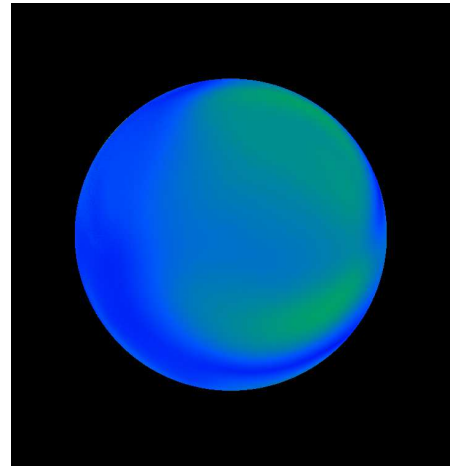
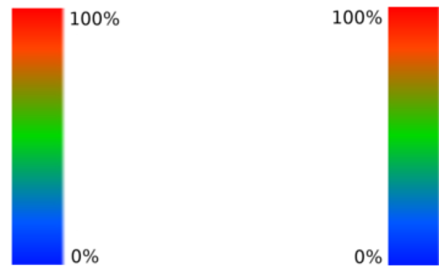
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

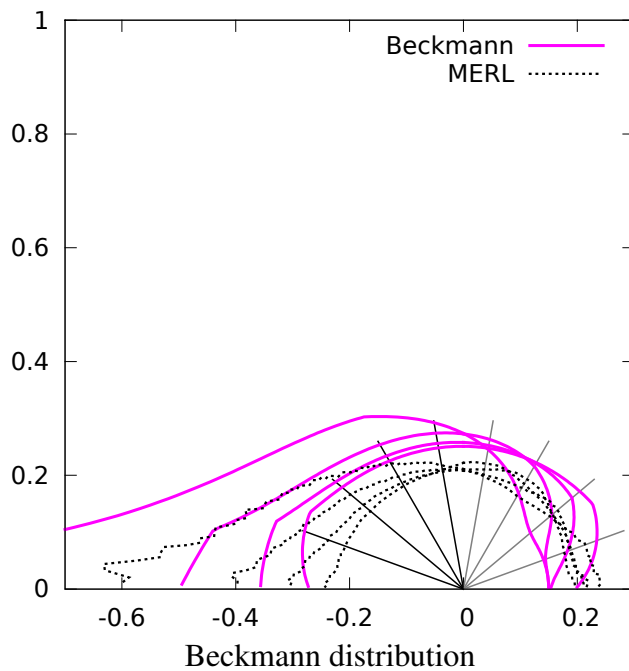
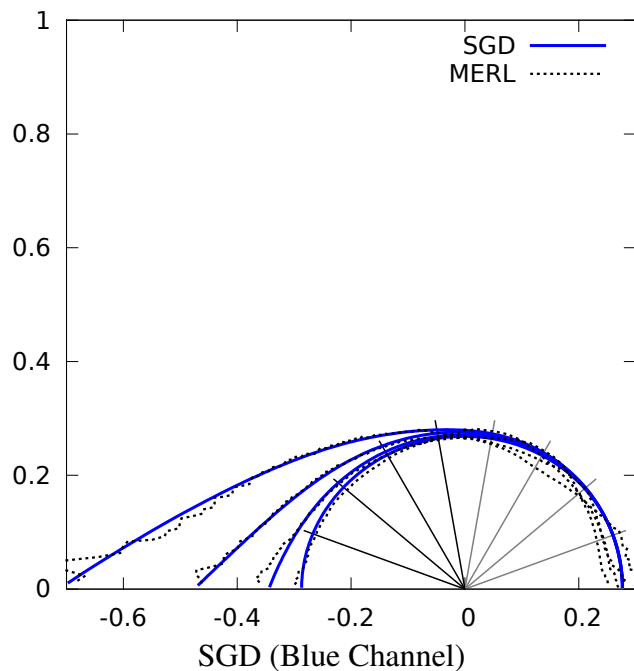
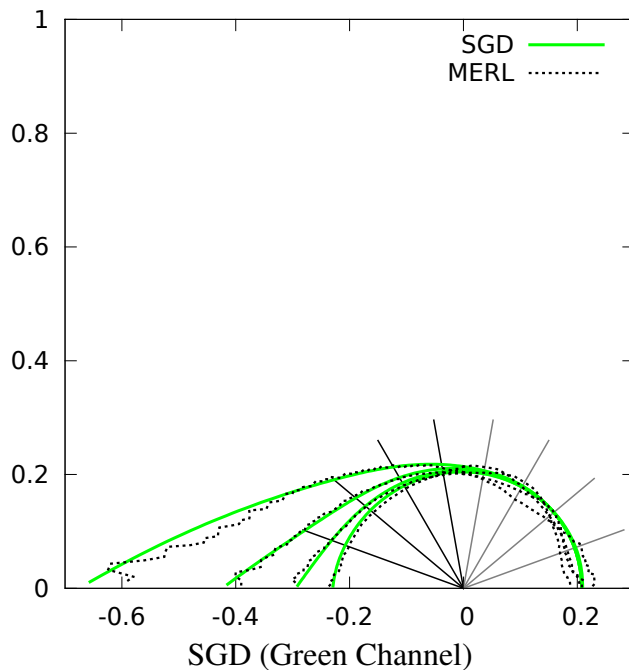
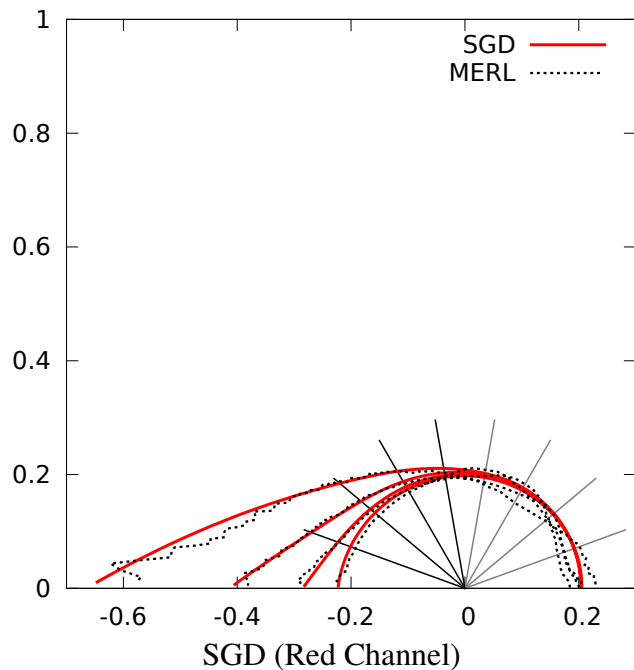
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0267828	0.0825614	0.248706	9.23066e-13	0.201626	0.225891	5.15615	0.000323043
Green	0.0281546	0.0853369	0.249248	1.66486e-12	0.213723	0.226267	5.14773	0.00032064
Blue	0.066668	0.0495164	0.18736	2.27218e-12	0.56548	0.638493	6.43713	0.000653631

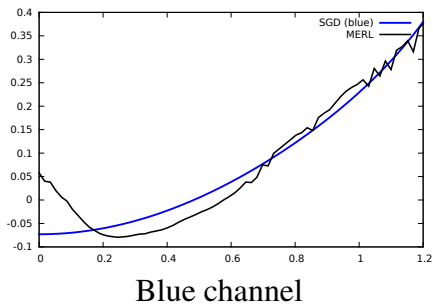
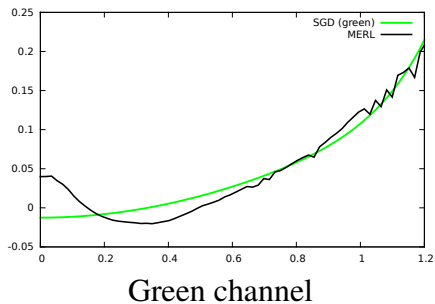
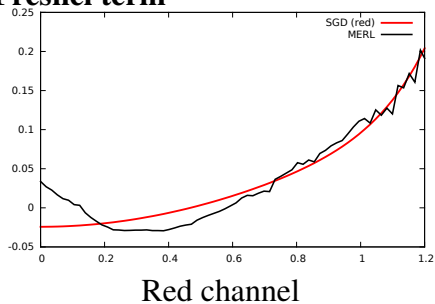
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.25846	0.128037	6.95531	0.407528
Green	2.25536	0.128363	6.94633	0.407534
Blue	2.68382	0.0944915	8.17665	0.411378

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *blue-metallic-paint2*

Rendered Images



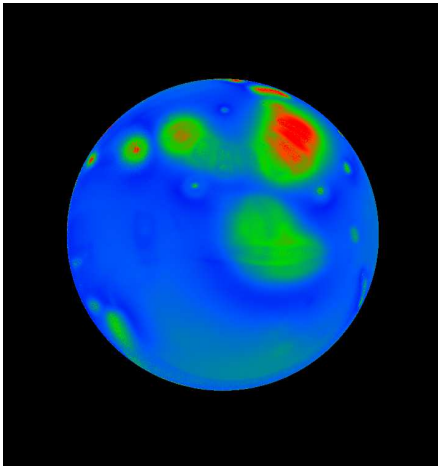
SGD



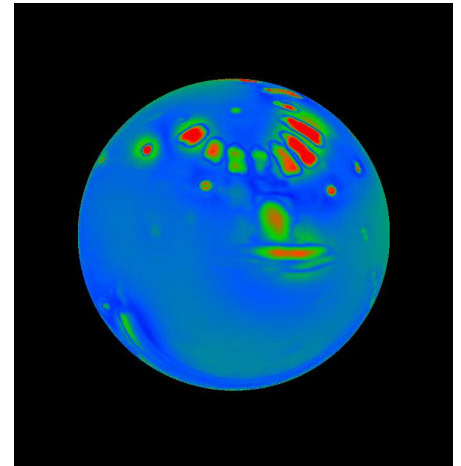
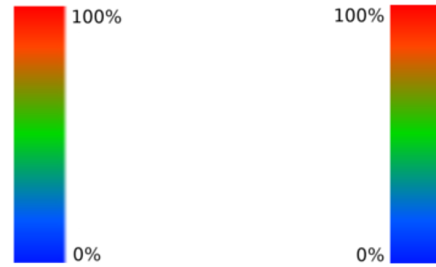
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

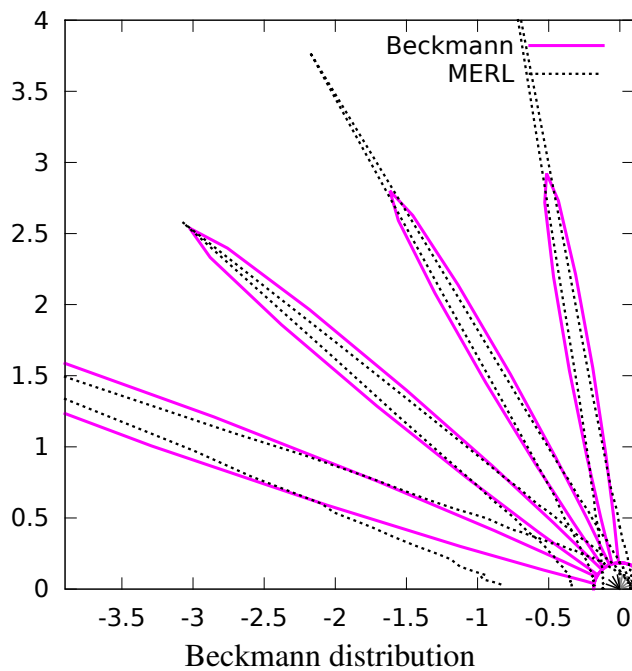
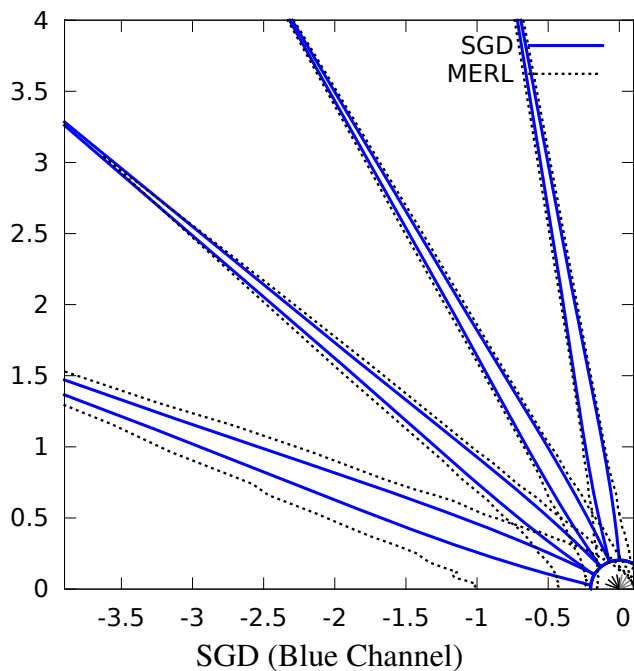
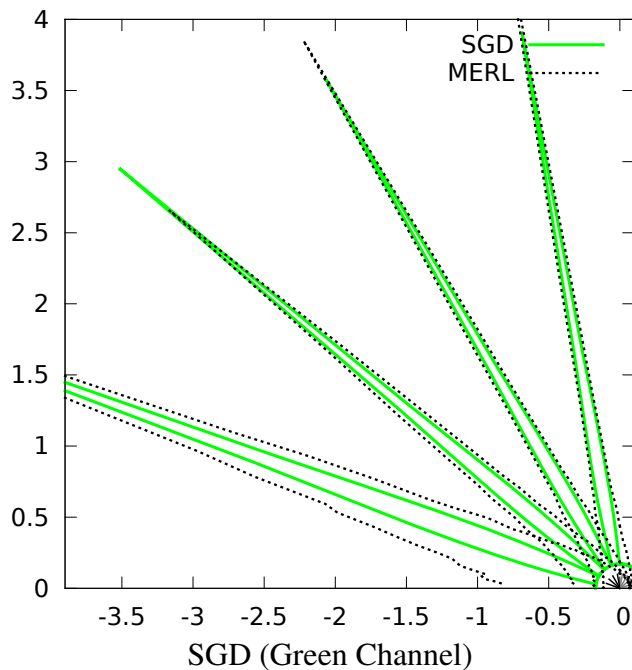
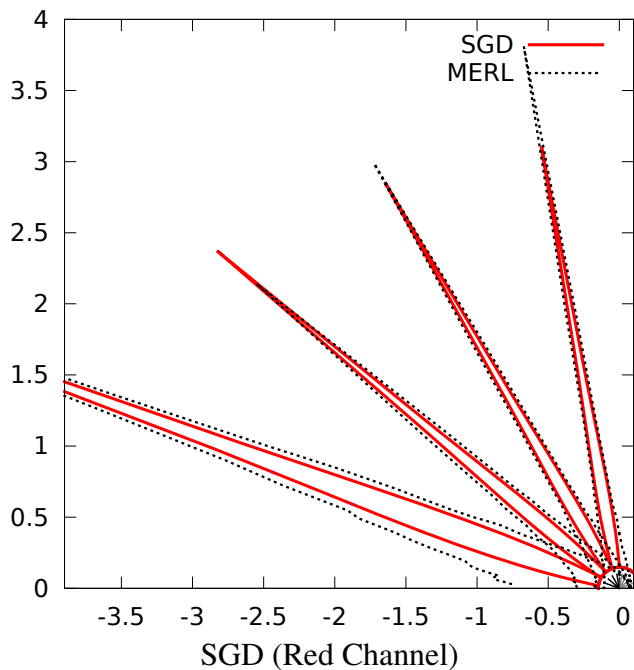
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.010143	0.0795798	0.00149045	0.624615	9.36434e-14	-0.210234	314.024	0.0908879
Green	0.0157349	0.0234493	0.00110477	0.598721	3.61858e-15	-1	441.812	0.163236
Blue	0.0262717	0.0492337	0.00141008	0.67116	1.15633e-14	-1	299.726	0.286541

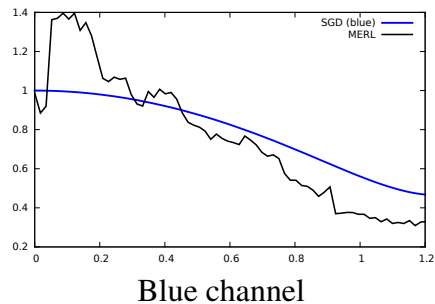
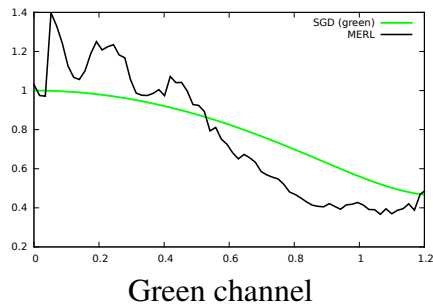
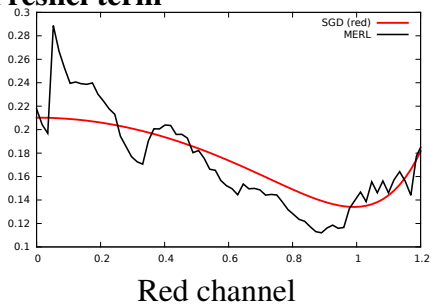
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.20935e-05	3.38901e-07	27.0491	-0.326593
Green	7.51792e-06	2.94502e-07	28.576	-0.274443
Blue	3.86474e-05	3.15718e-07	30.6214	-0.187842

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *blue-metallic-paint*

Rendered Images



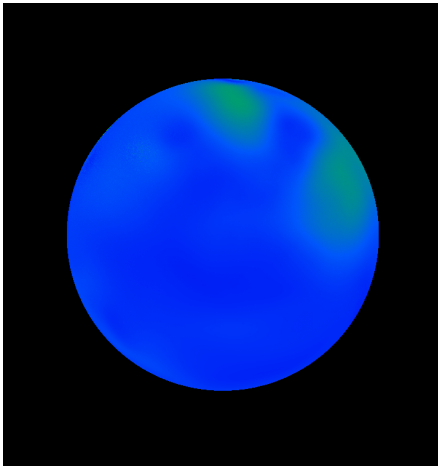
SGD



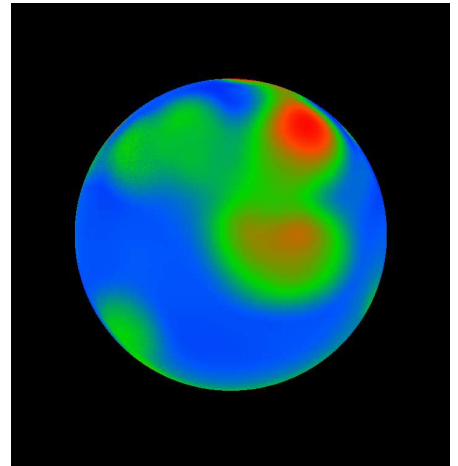
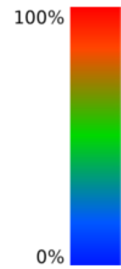
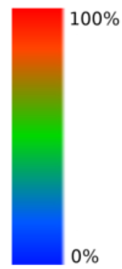
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

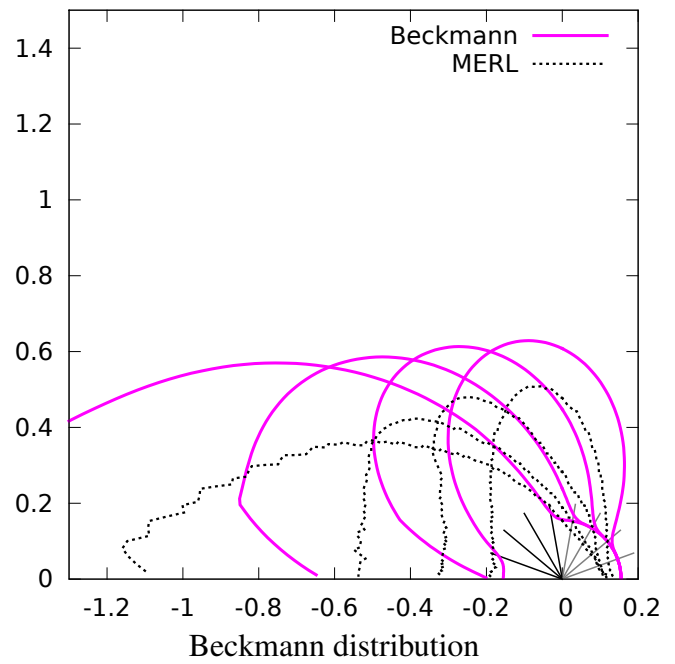
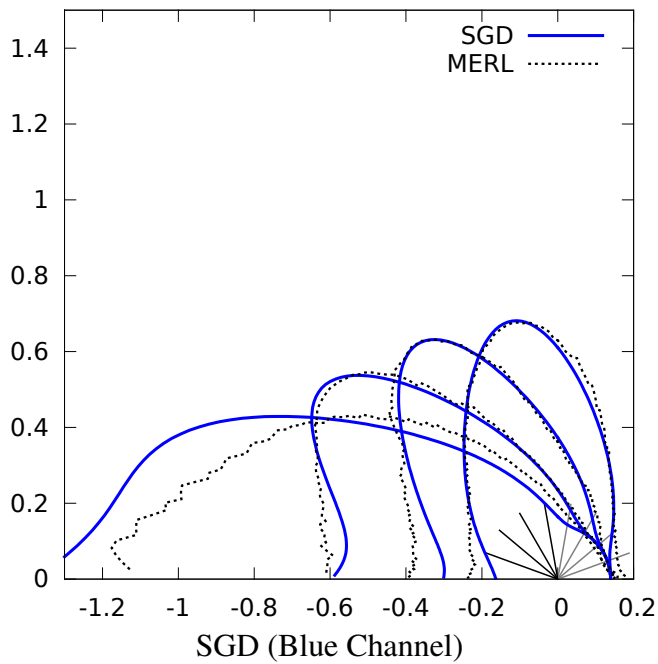
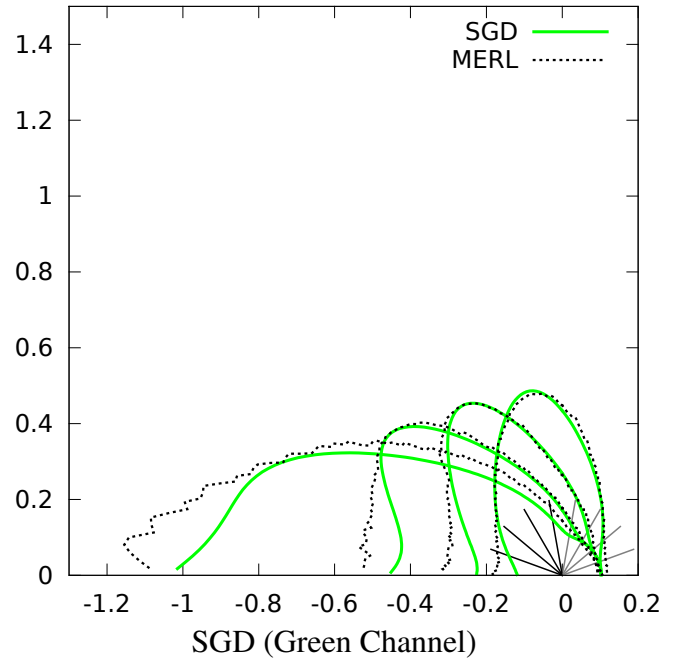
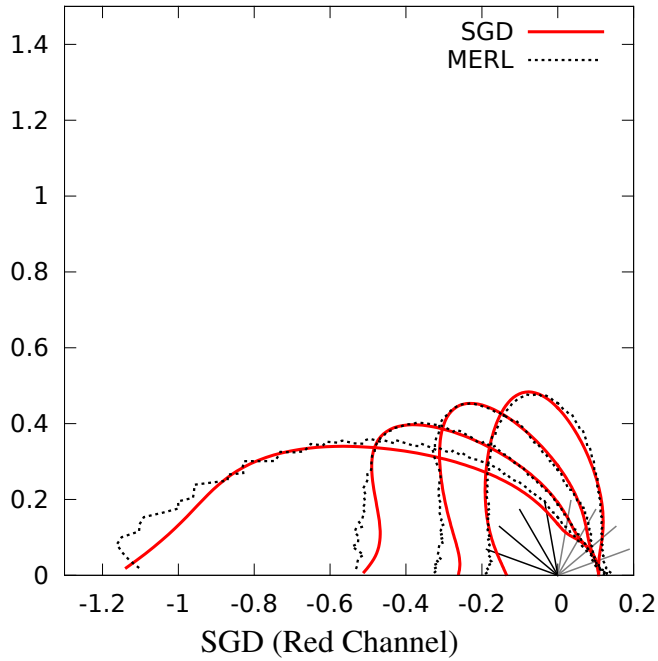
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00390446	0.0706771	0.155564	1.01719	0.149347	-0.487331	4.4222	0.00202544
Green	0.00337319	0.0415082	0.139	1.02602	0.153181	-0.76557	4.59265	0.00246268
Blue	0.00848198	0.104423	0.15088	1.16153	1.87241e-14	-1	3.93929	0.0059725

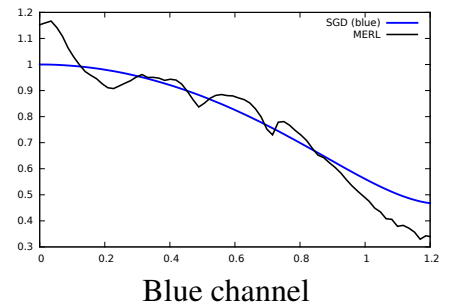
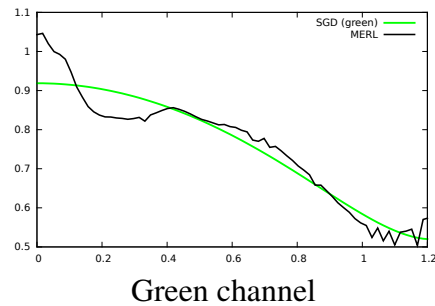
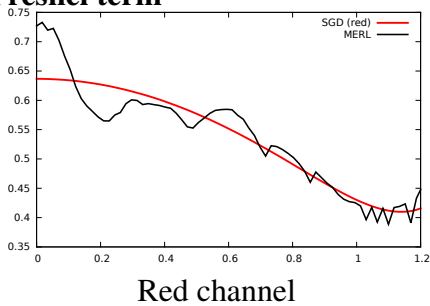
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.54345	6.04906e-08	23.9533	-0.34053
Green	2.33884	5.81858e-08	25.0641	-0.294595
Blue	2.24405	1.2419e-07	24.6856	-0.258117

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *blue-rubber*

Rendered Images



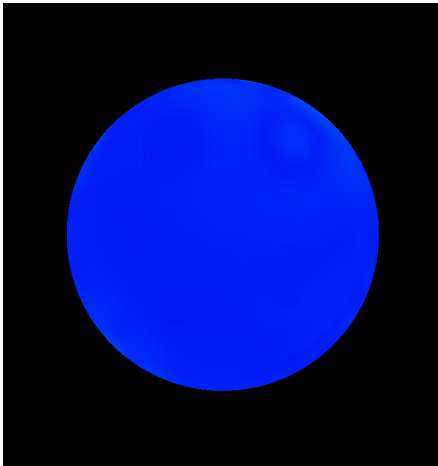
SGD



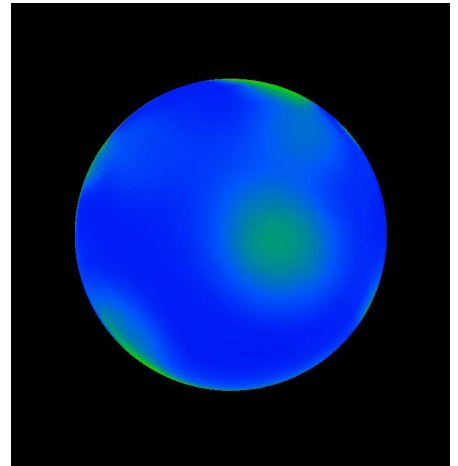
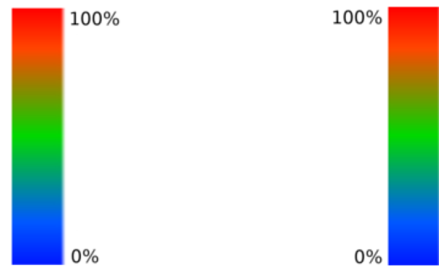
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

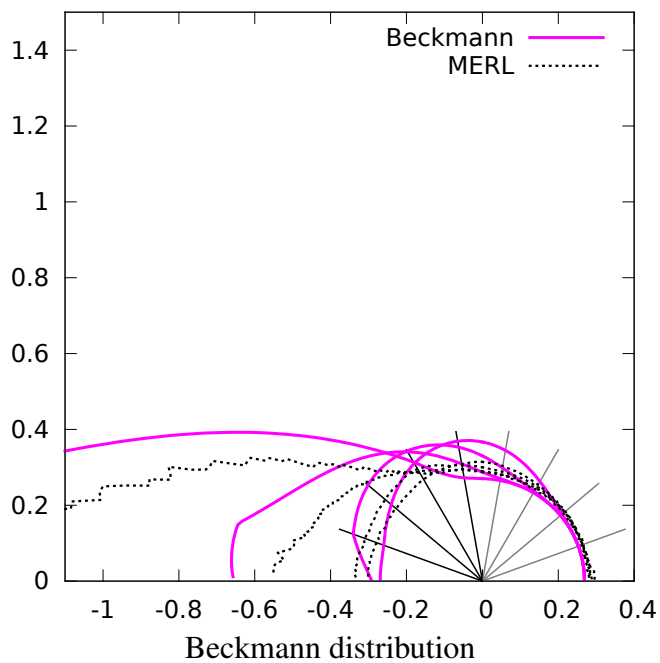
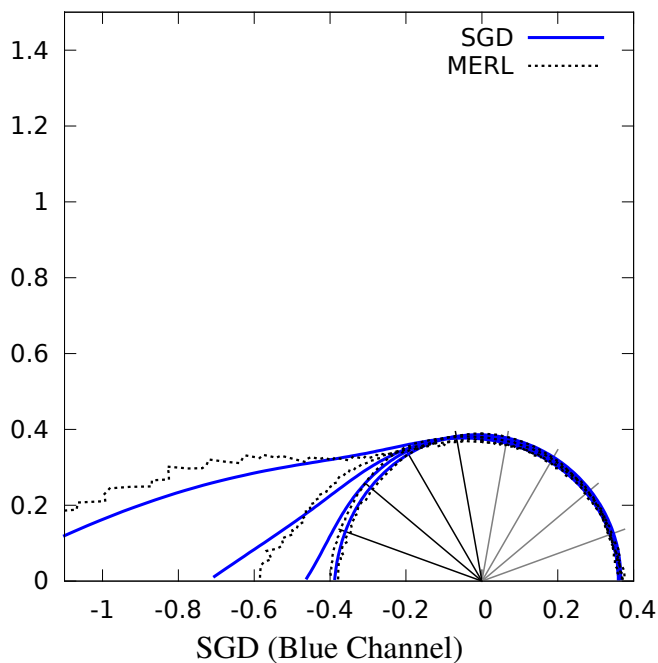
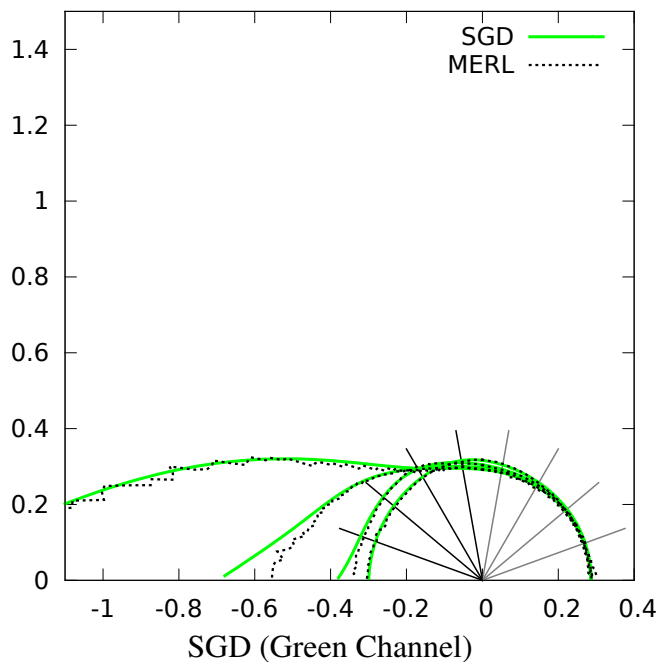
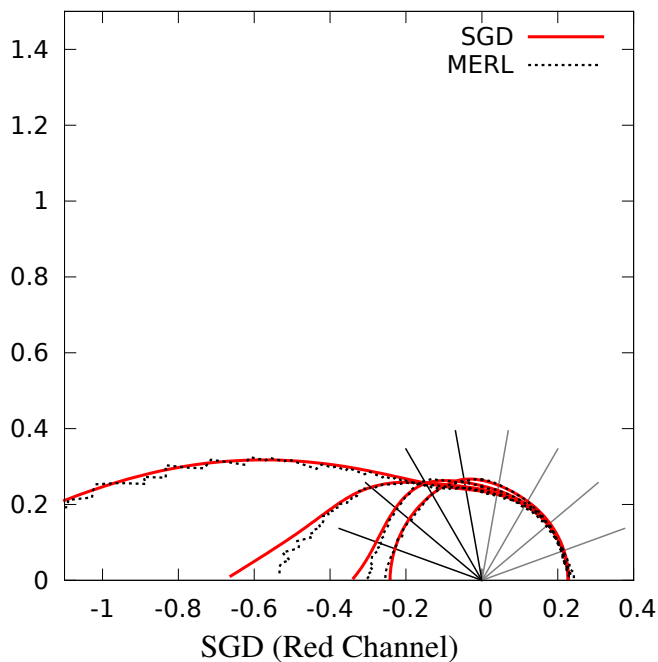
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0371302	0.384232	0.218197	0.815054	0.0631713	0.0478254	4.41586	0.000630461
Green	0.0732915	0.412357	0.2668	1.00146	0.0622636	0.0422186	3.76795	0.000733287
Blue	0.146637	0.612608	0.478375	1.24995	0.0399196	0.007015	3.46276	0.00171092

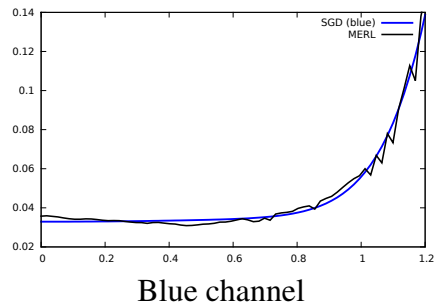
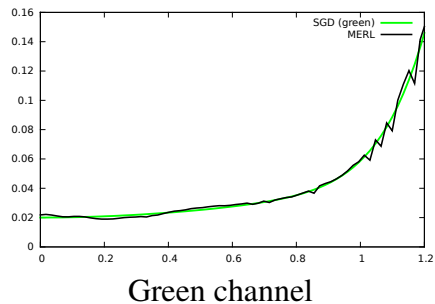
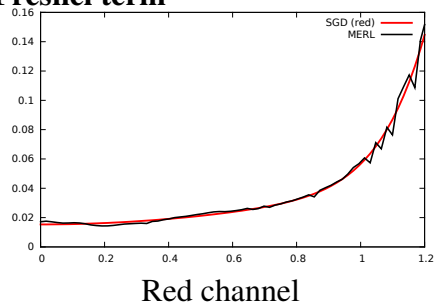
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.77807	1.2941e-07	19.8046	-0.499472
Green	3.82679	1.07194e-07	19.3115	-0.557706
Blue	3.33186	0.00045665	11.4364	-0.172177

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *brass*

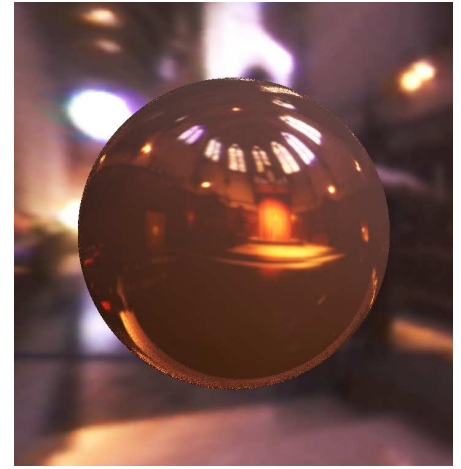
Rendered Images



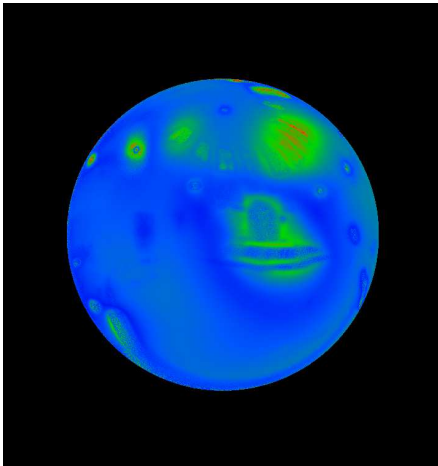
SGD



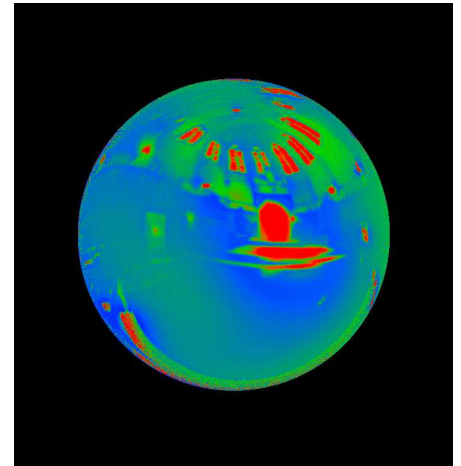
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

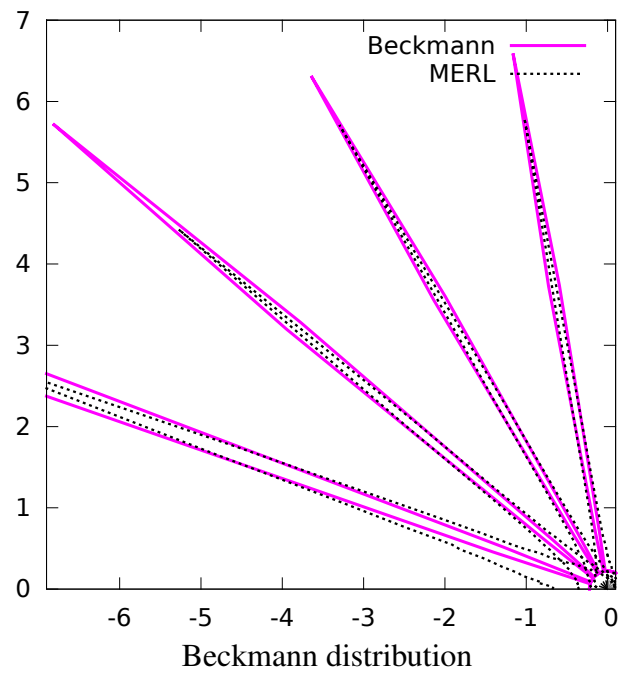
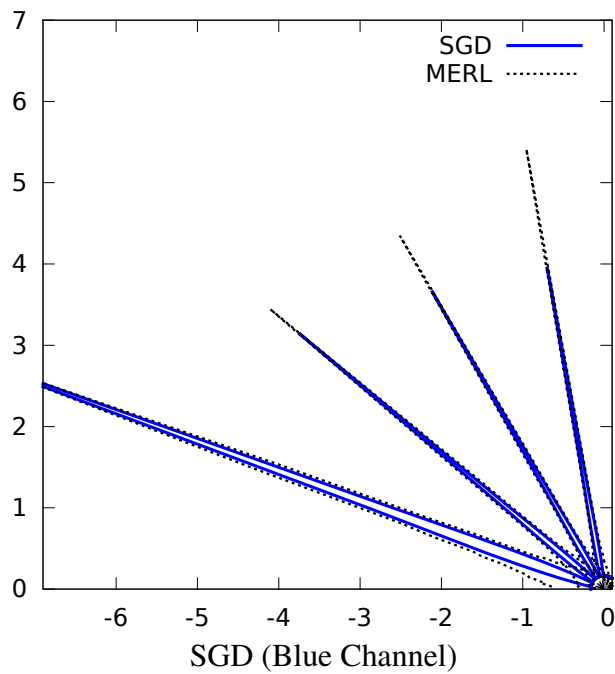
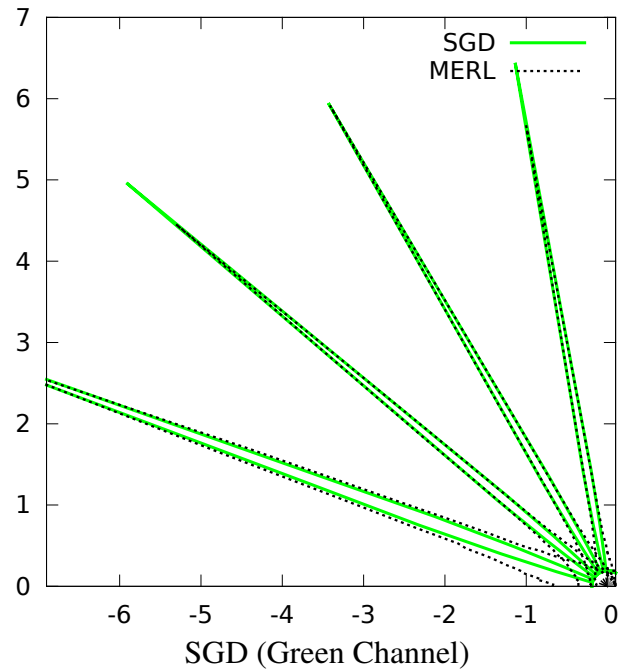
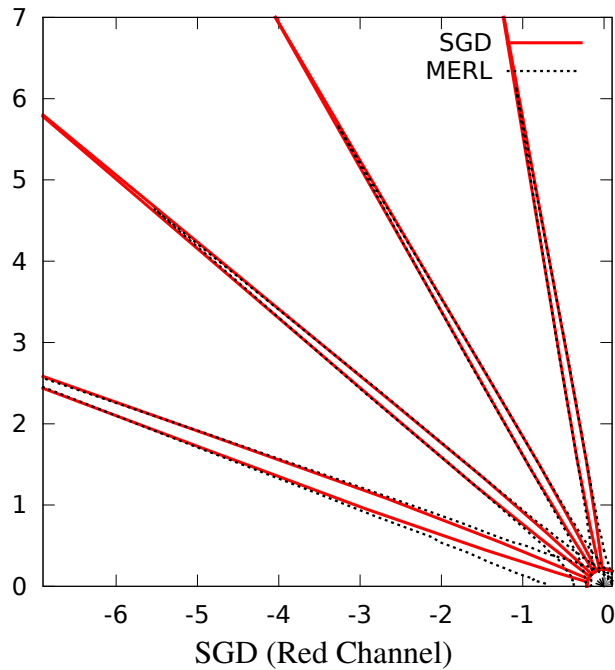
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0301974	0.0557826	0.0002028	0.362322	0.639886	-0.360114	3517.61	0.440765
Green	0.0223812	0.0376687	0.000258468	0.401593	0.12354	-0.87646	2612.49	0.200948
Blue	0.0139381	0.0775998	0.00096108	0.776606	0.0197853	-0.0919344	331.815	0.15549

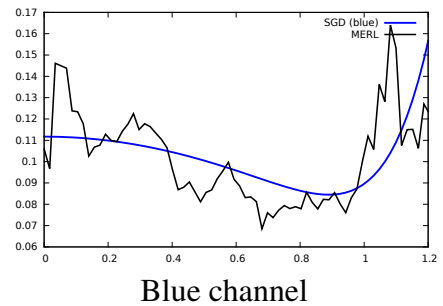
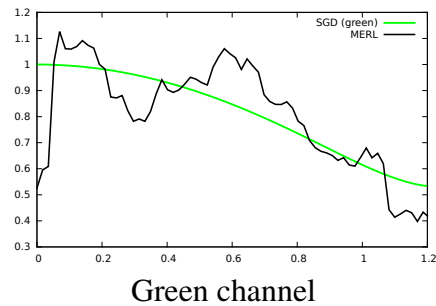
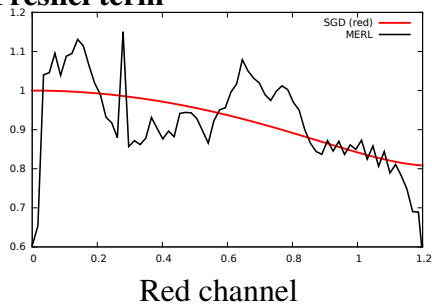
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.64061	1.01146e-07	312.802	0.522711
Green	2.87206	9.83073e-08	283.431	0.516719
Blue	0.529487	5.48819e-08	183.091	0.474834

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *cherry-235*

Rendered Images



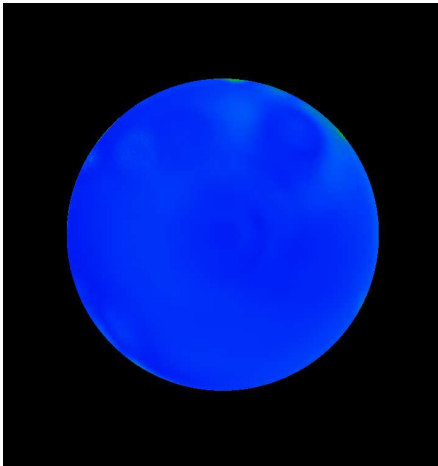
SGD



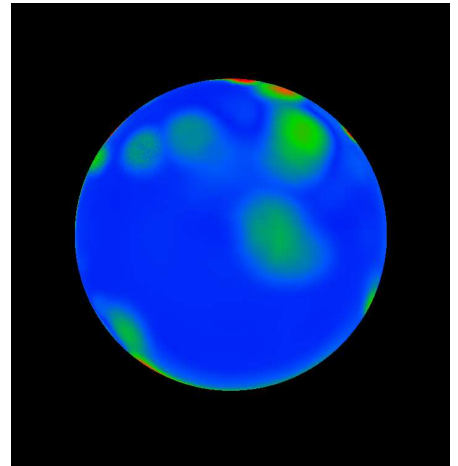
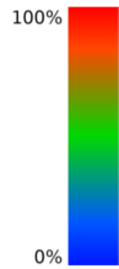
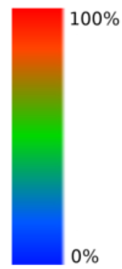
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

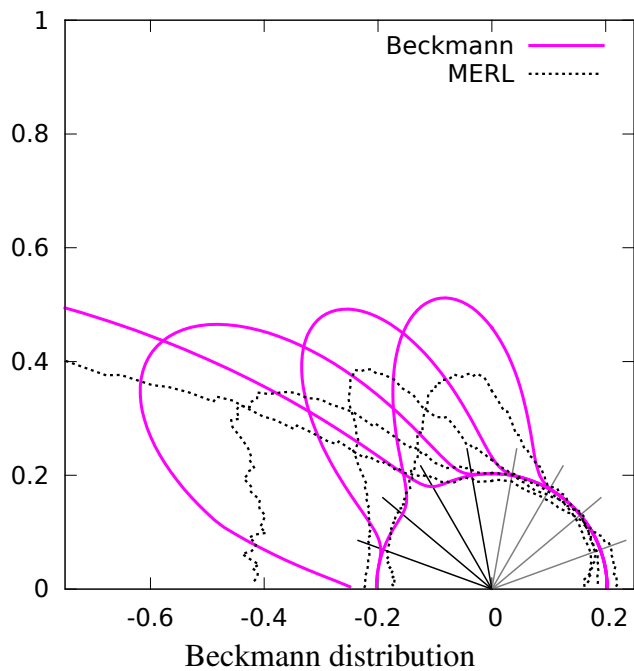
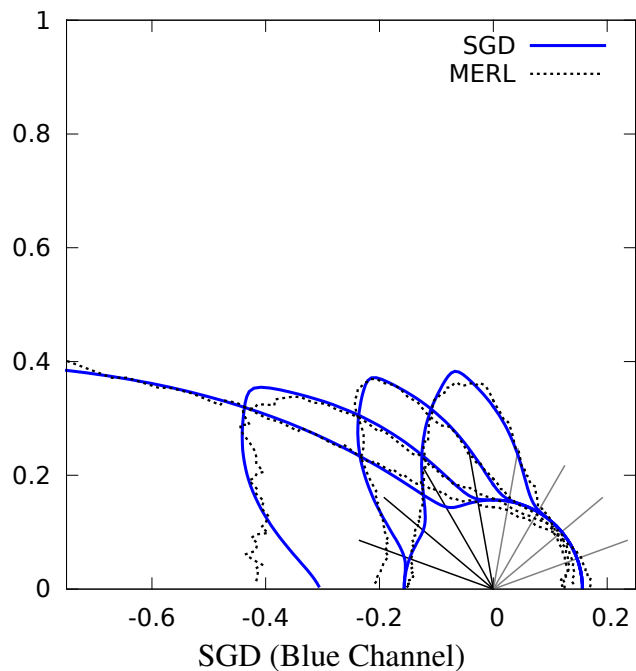
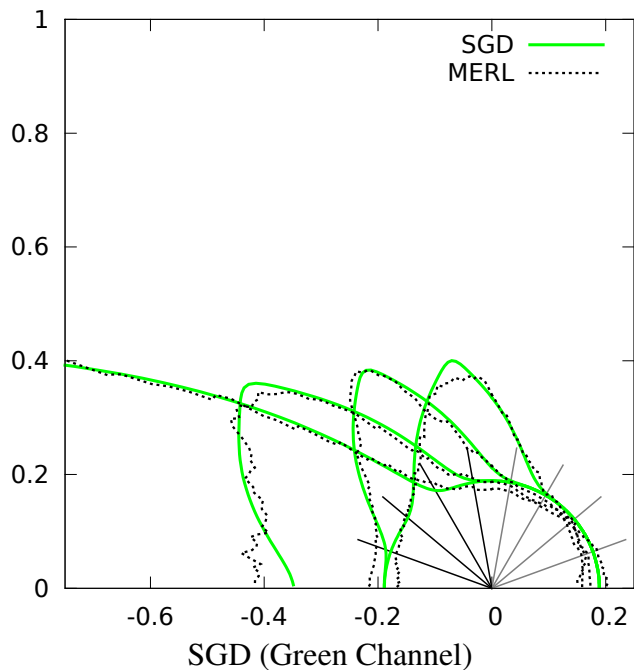
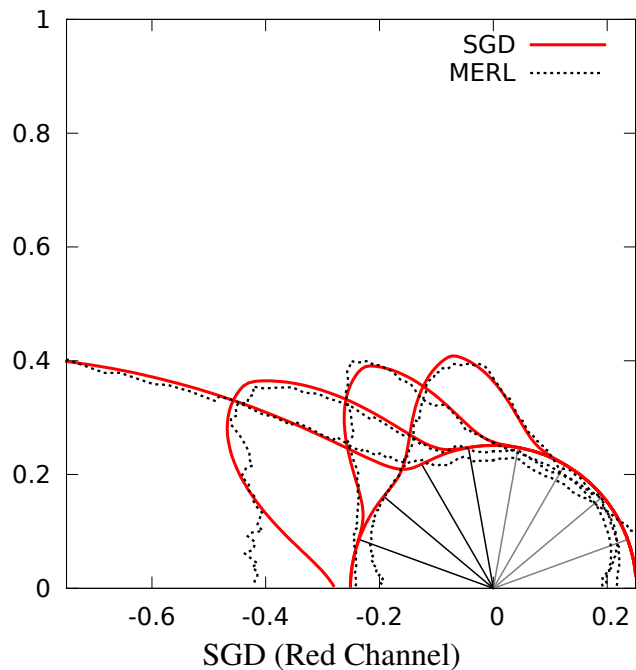
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0497502	0.166001	0.0182605	0.0358348	0.0713408	0.0200814	54.7448	0.00235908
Green	0.0211902	0.202786	0.0277997	0.163231	0.0571719	0.00887306	33.7294	0.00199931
Blue	0.0120688	0.165189	0.0255721	0.129135	0.0791809	0.0251675	37.36	0.00155902

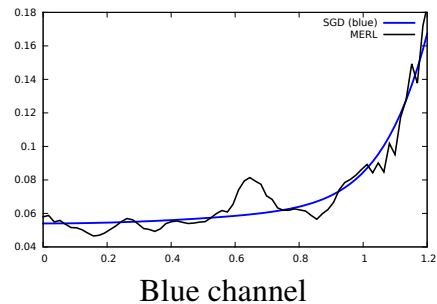
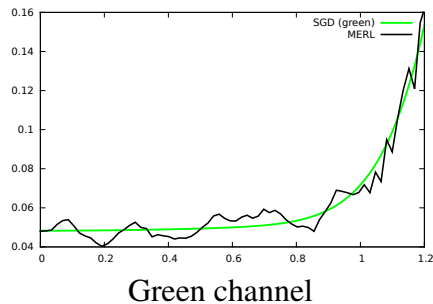
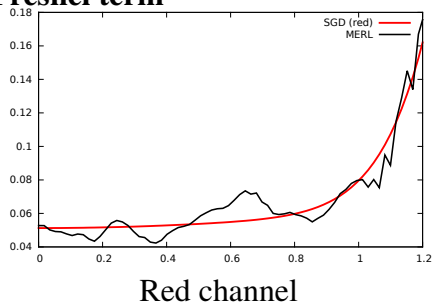
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.11314	30.3886	18.8114	0.816378
Green	6.23697	0.00191869	25.8454	0.387479
Blue	6.16351	0.0495069	23.3753	0.522125

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *chrome*

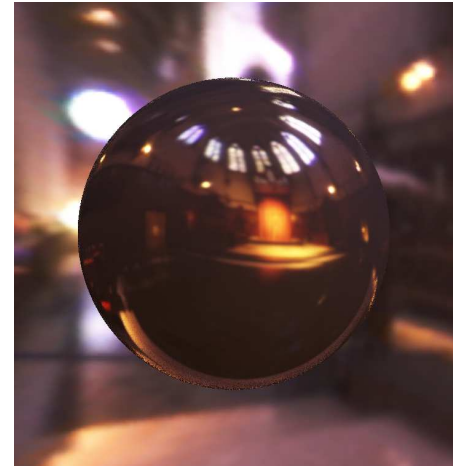
Rendered Images



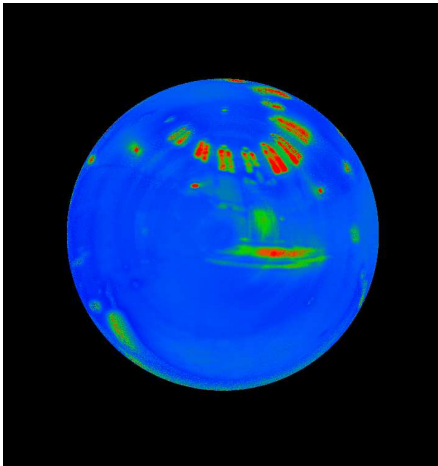
SGD



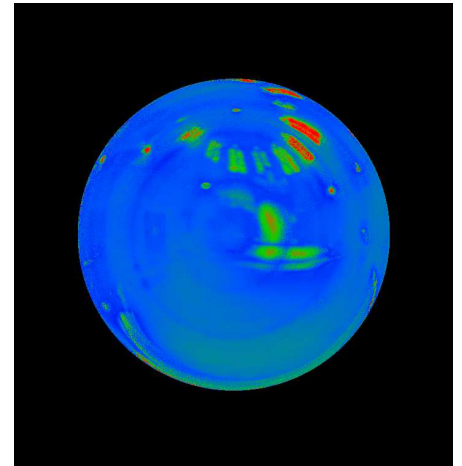
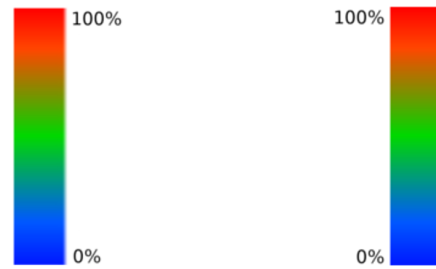
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

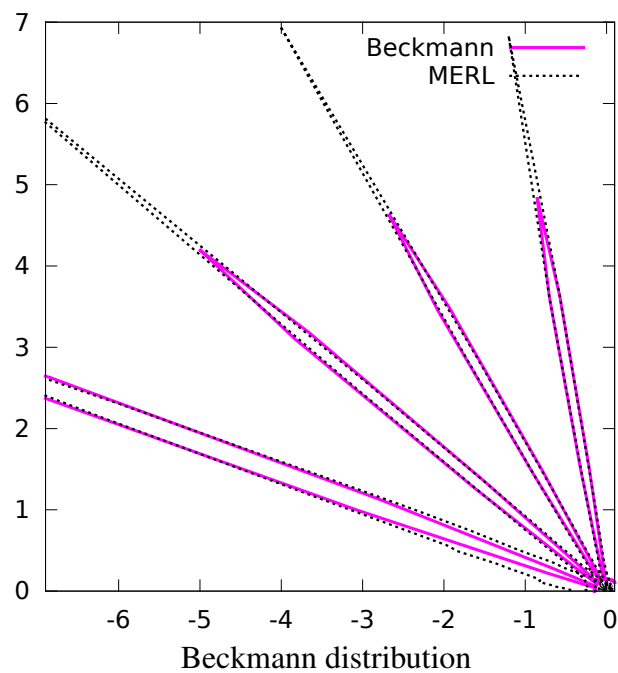
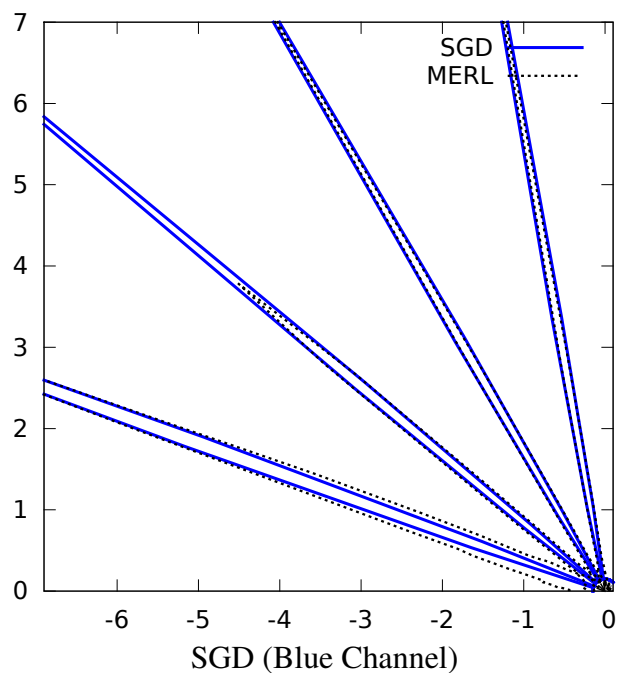
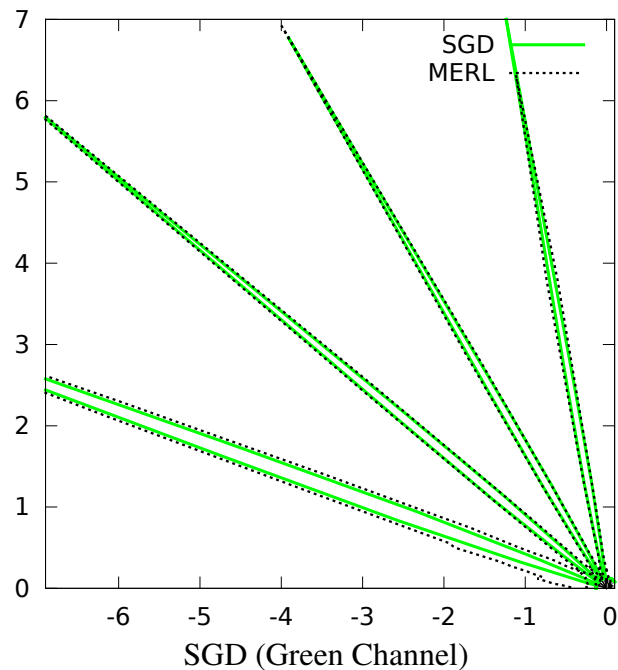
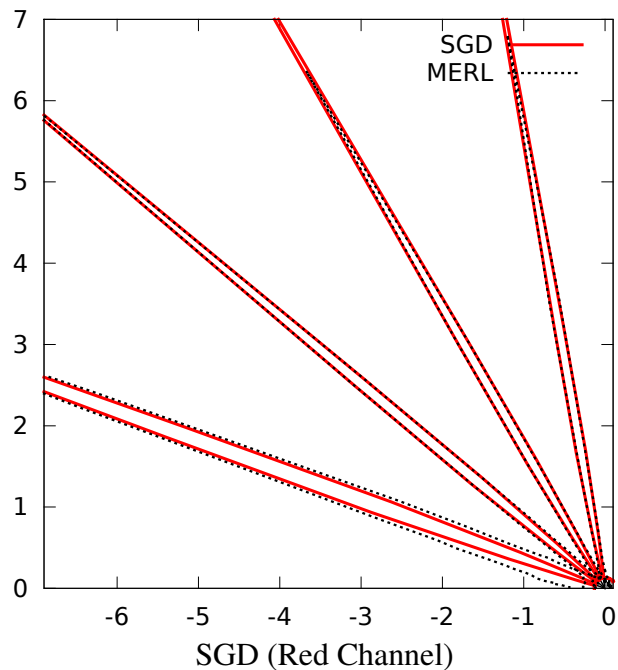
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00697189	0.0930656	0.000155335	0.353854	0.256314	-0.743686	4642.1	0.802138
Green	0.00655268	0.041946	0.000156872	0.3327	0.819565	-0.180435	4726.66	1.29121
Blue	0.0101854	0.104558	7.39851e-05	0.300437	3.22085e-13	-1	10421.9	1.06148

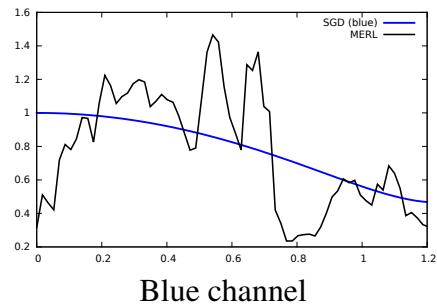
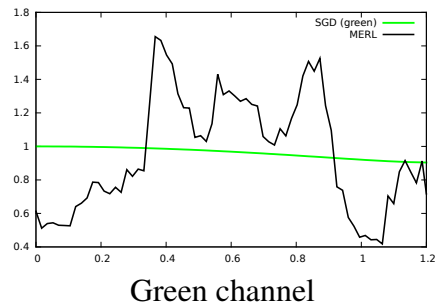
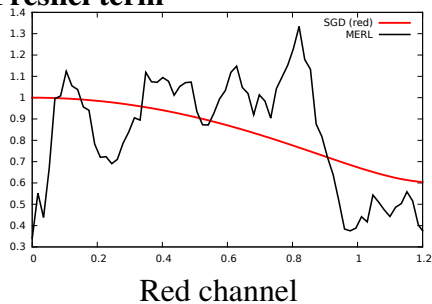
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.8545	5.30781e-08	354.965	0.526796
Green	4.44817	1.04045e-07	349.356	0.528469
Blue	5.40959	1.79834e+66	272.736	1.00293

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *chrome-steel*

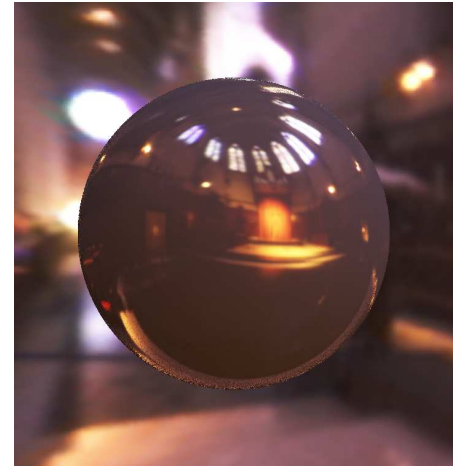
Rendered Images



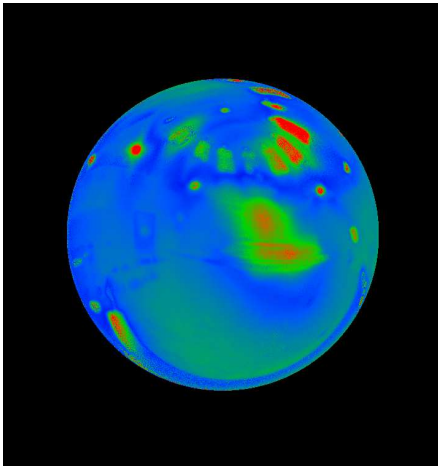
SGD



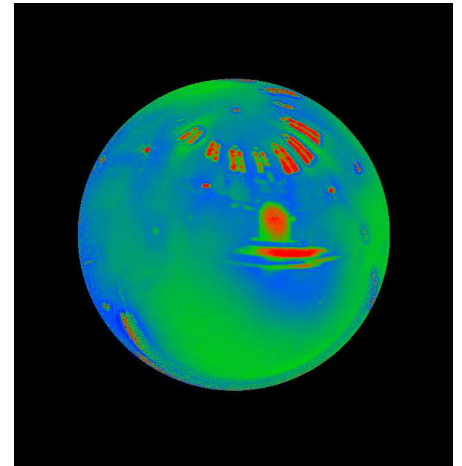
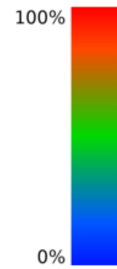
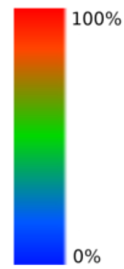
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

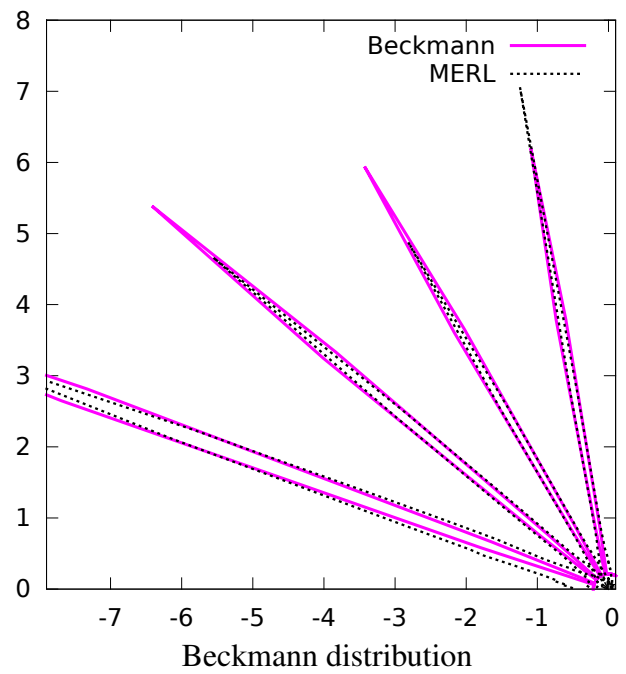
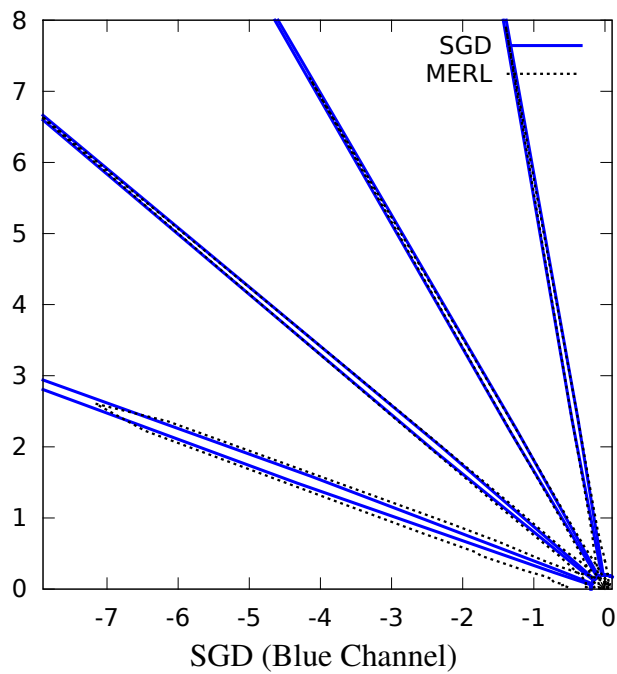
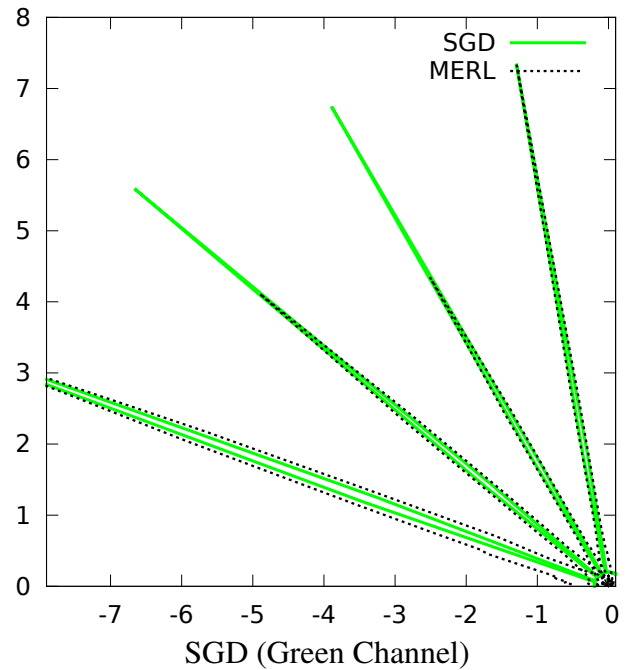
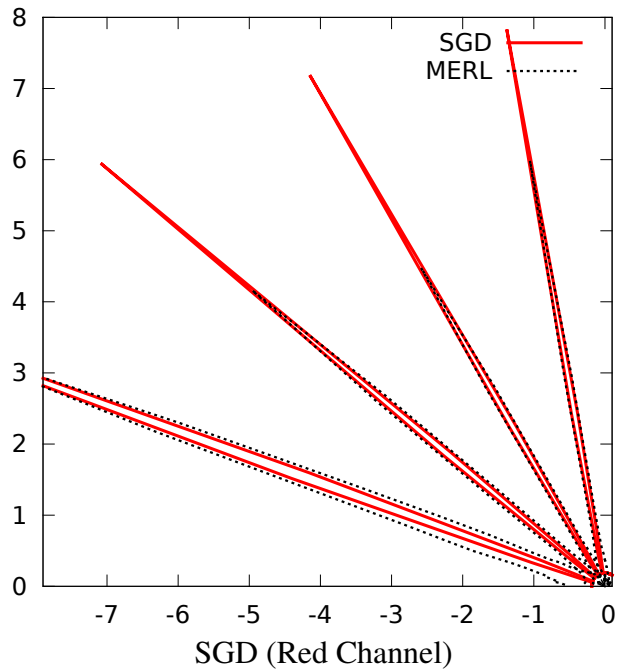
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0206718	0.129782	5.51292e-05	0.207979	1.18818e-12	-0.316807	15466.8	0.552277
Green	0.0240818	0.109032	3.13288e-05	0.152758	2.06813e-11	-0.265326	28628.9	0.448267
Blue	0.024351	0.0524555	4.51944e-05	0.325431	0.580895	-0.419105	16531.2	1.12869

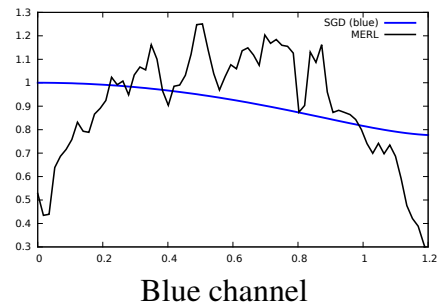
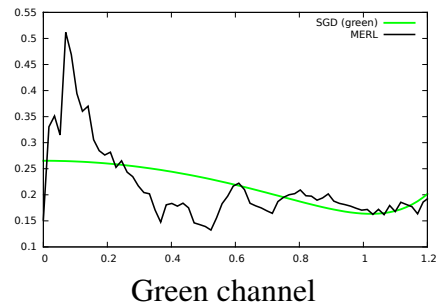
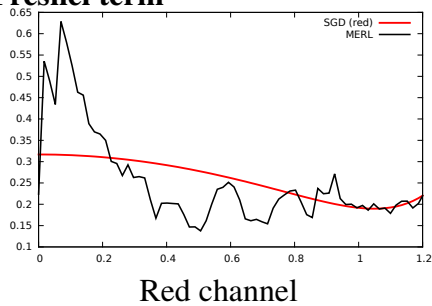
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	12.8988	1.43049e+84	197.744	1.20035
Green	68.7898	1.63655e+109	257.536	1.2003
Blue	4.68237	44.7025	618.155	0.579562

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *colonial-maple-223*

Rendered Images



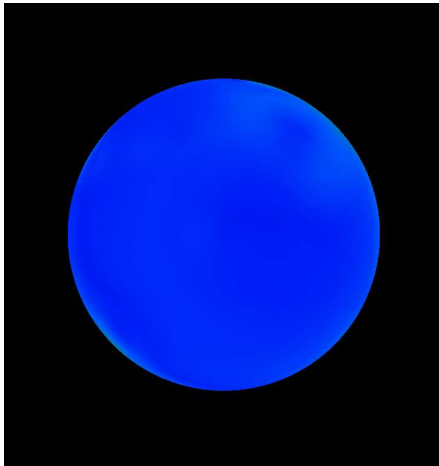
SGD



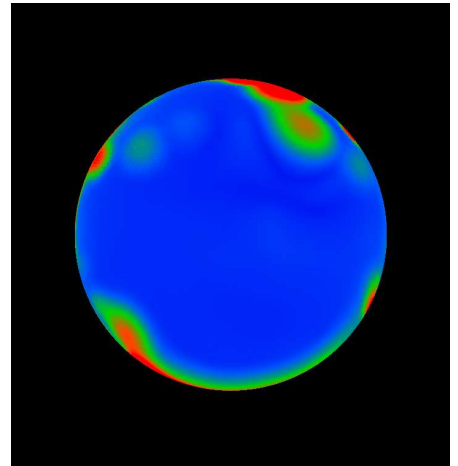
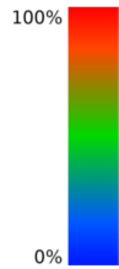
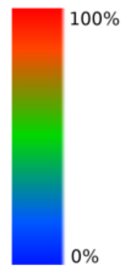
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

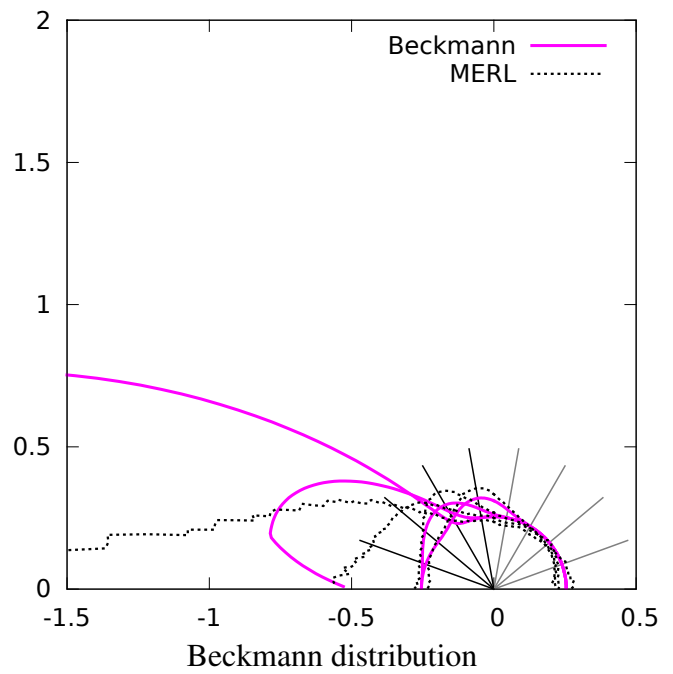
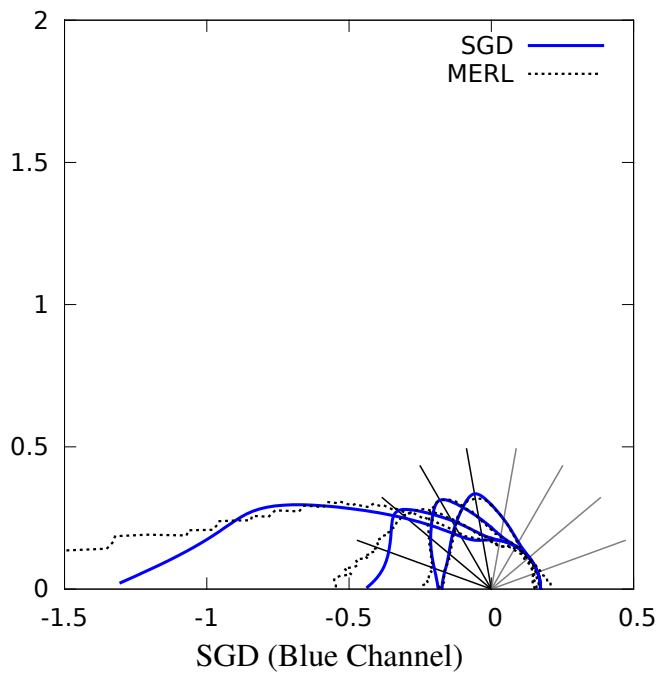
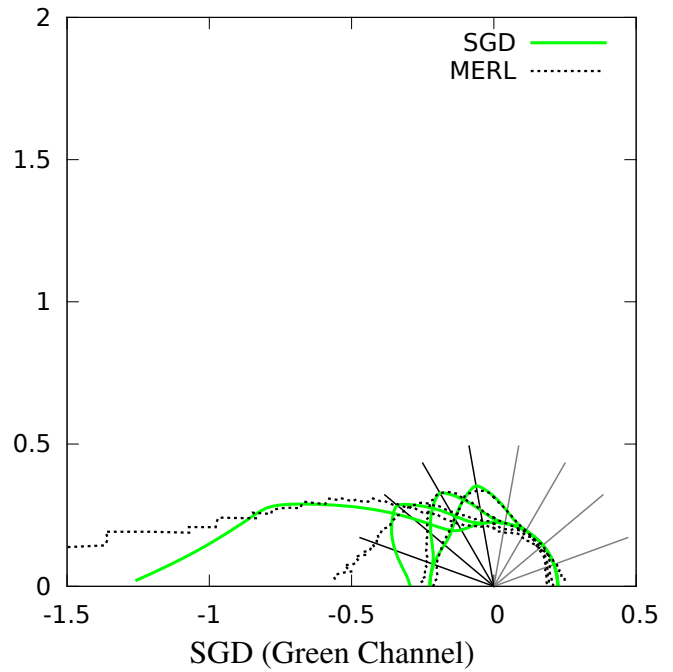
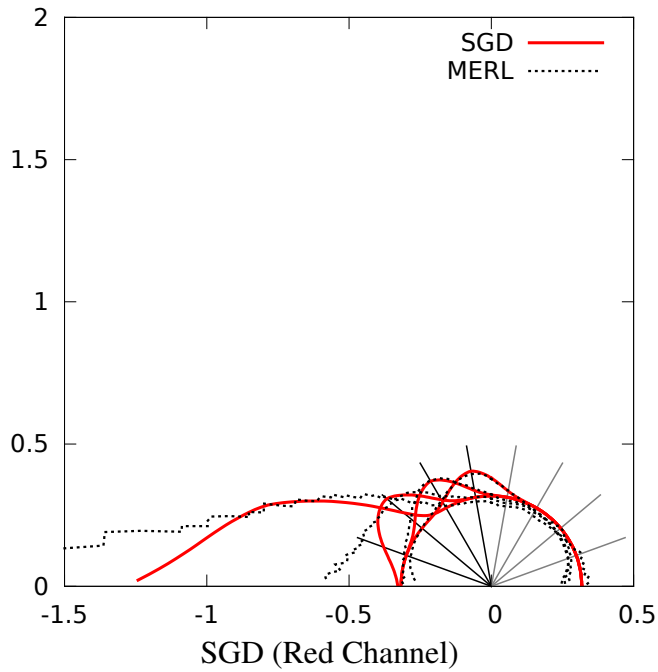
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.100723	0.059097	0.0197628	0.0311867	0.0576683	-0.0503364	50.7952	0.00229125
Green	0.0356306	0.0661341	0.0279336	0.112022	0.0617498	-0.0382196	34.6835	0.00193164
Blue	0.0162408	0.11024	0.0621265	0.344348	0.0479061	-0.0382636	14.201	0.0013723

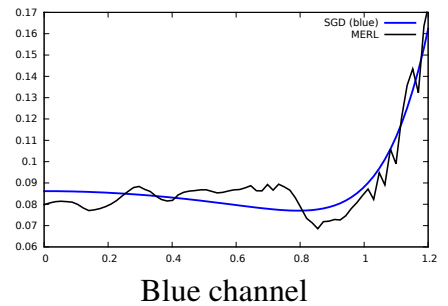
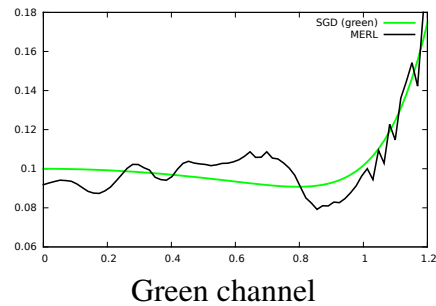
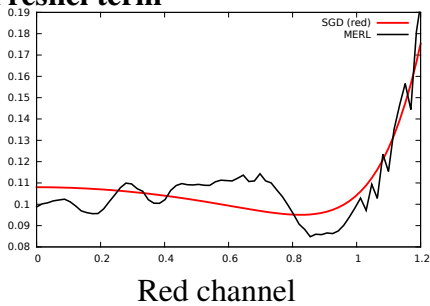
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.03342	18.9034	18.3749	0.801289
Green	6.01053	0.087246	21.6159	0.544191
Blue	4.56588	1.03757e-07	26.9347	-0.139944

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *color-changing-paint1*

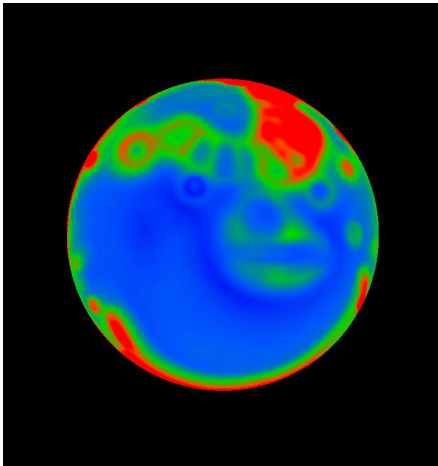
Rendered Images



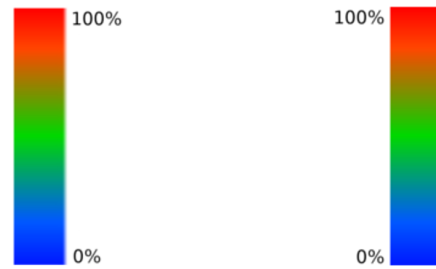
SGD



Reference



SGD (Lab difference)



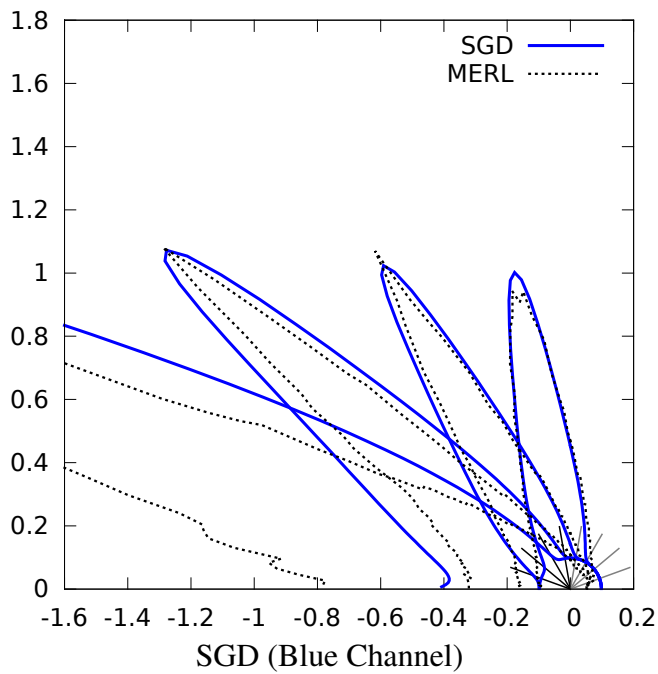
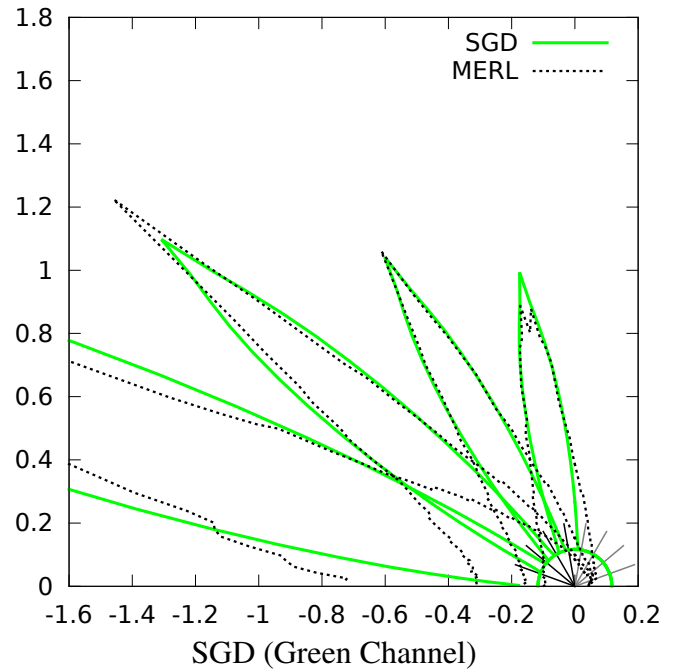
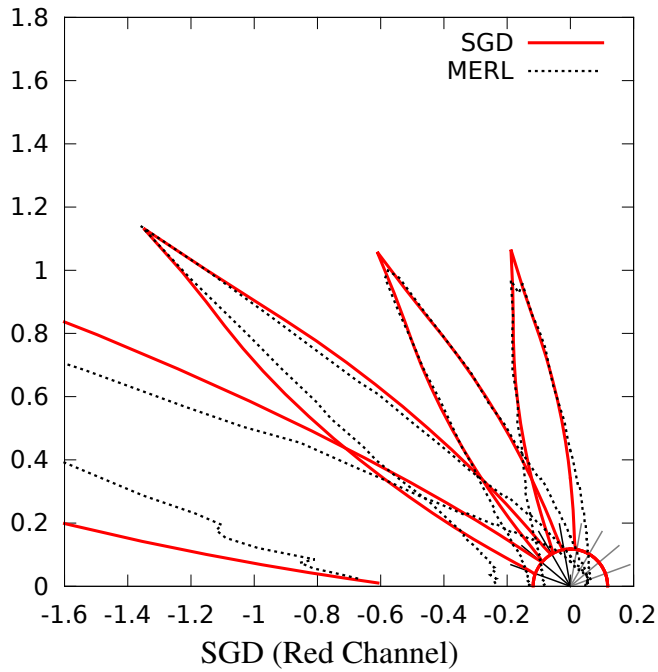
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00513496	1.53167	0.00320129	0.167301	0.0208525	0.0101418	279.058	0.164144
Green	0.00500415	0.430731	0.0023053	0.100003	0.109366	0.0801275	407.716	0.0515527
Blue	0.00296872	1.48308	0.0329464	1.04868	0.0553211	0.0357004	9.71061	0.116602

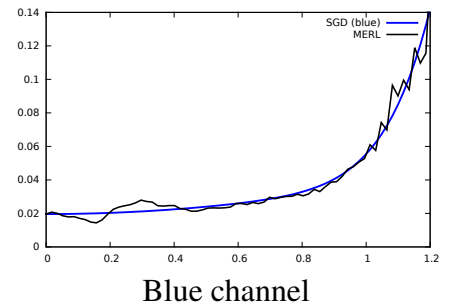
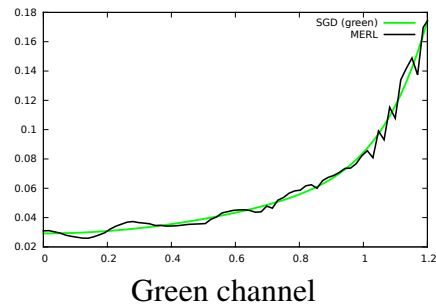
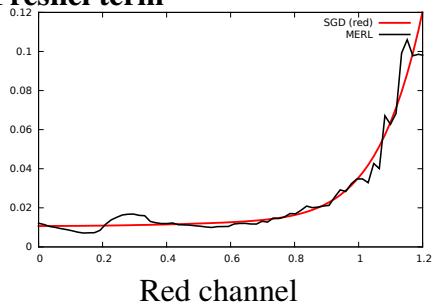
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.73768	2.66398e+08	36.7257	1.01208
Green	7.19333	8.98323e+10	27.8164	1.19549
Blue	1.04729	4.16363e-08	45.5388	0.131148

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *color-changing-paint2*

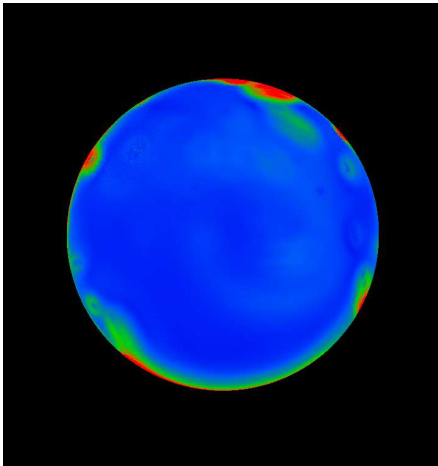
Rendered Images



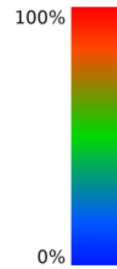
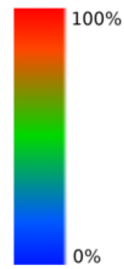
SGD



Reference



SGD (Lab difference)



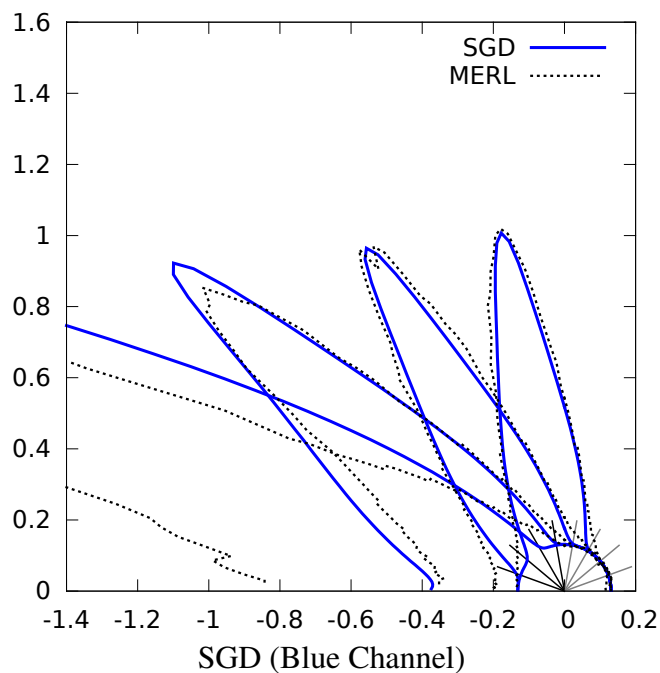
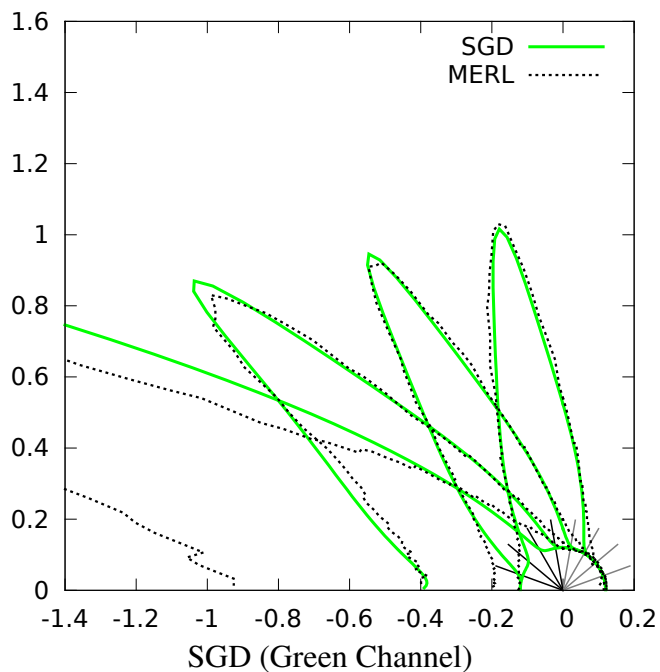
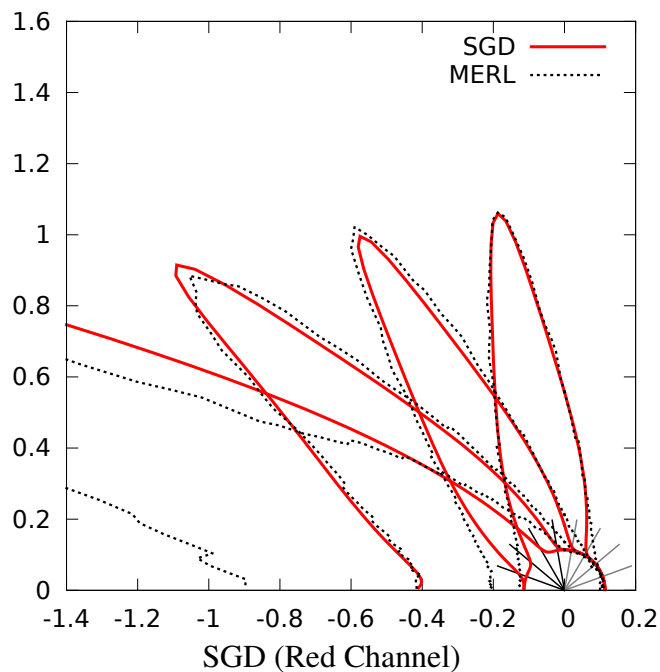
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00463528	1.35172	0.0279961	0.720154	0.019073	-0.0181694	18.6722	0.0489296
Green	0.00544054	1.47838	0.0267135	0.717648	0.00825302	-0.0198592	19.4709	0.0499662
Blue	0.0070818	1.29831	0.0257468	0.694662	0.0301024	-0.000522292	20.7514	0.054555

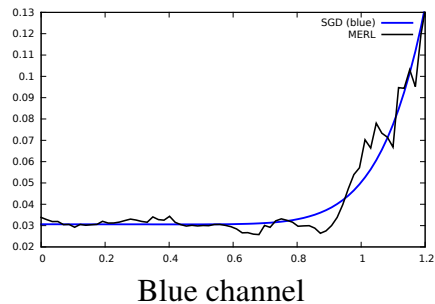
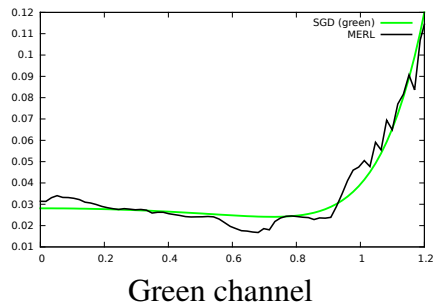
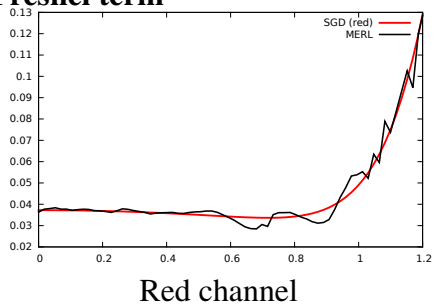
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.56832	1.19918e-07	41.295	0.124794
Green	1.554	9.95358e-08	42.1716	0.129237
Blue	1.60402	9.69838e-08	42.3986	0.132024

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *color-changing-paint3*

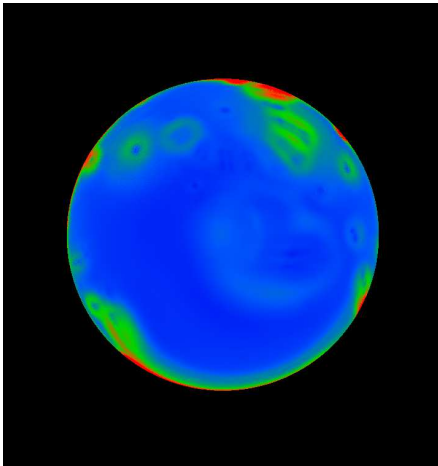
Rendered Images



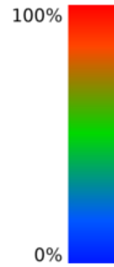
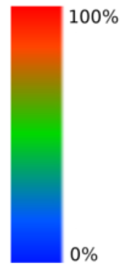
SGD



Reference



SGD (Lab difference)



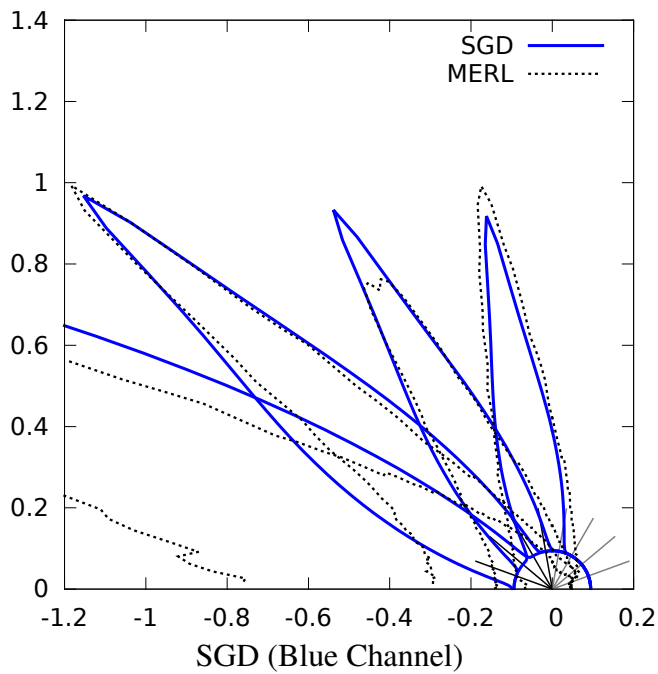
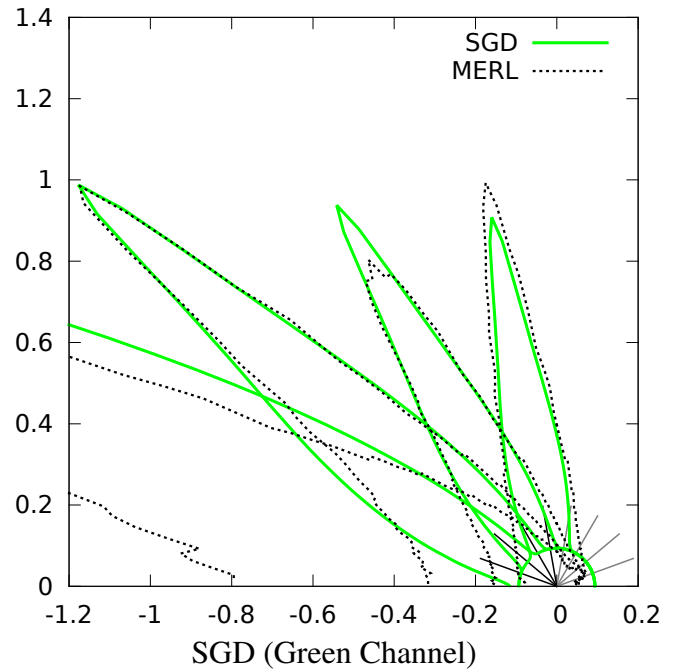
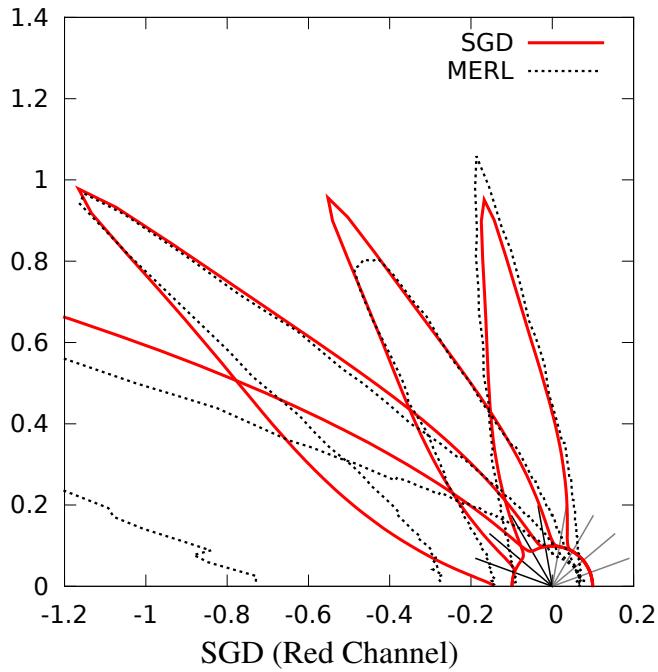
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00305737	0.880793	0.014742	0.537248	0.055479	0.0315282	42.1798	0.0484699
Green	0.00257341	0.691268	0.0135513	0.572188	0.0666783	0.0457554	43.3684	0.0342594
Blue	0.00263616	0.707821	0.0108894	0.457665	0.0585094	0.0365558	62.0624	0.0347198

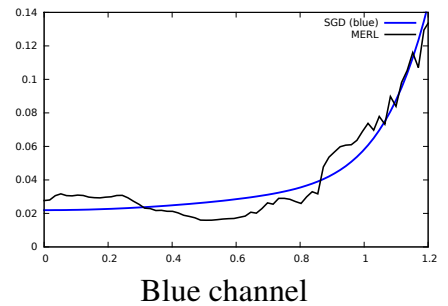
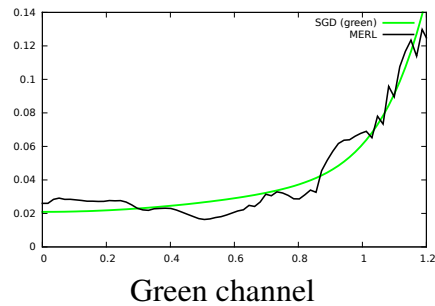
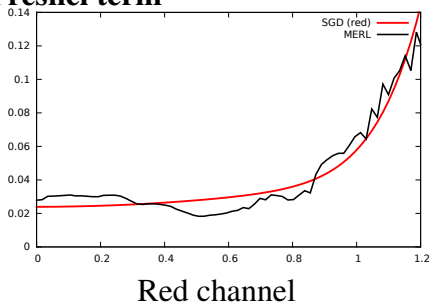
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.06002	5.0531e-08	50.0948	0.197971
Green	1.82703	9.99088e-08	52.0344	0.229219
Blue	2.54086	5.726e-08	54.643	0.241049

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *dark-blue-paint*

Rendered Images



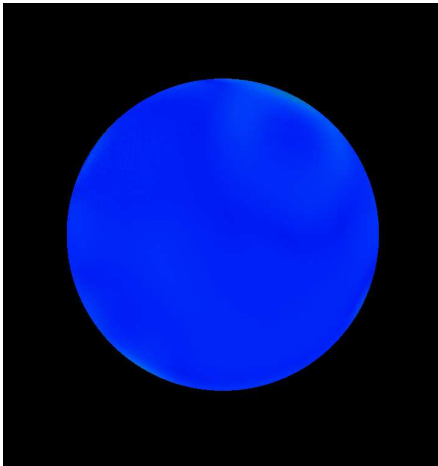
SGD



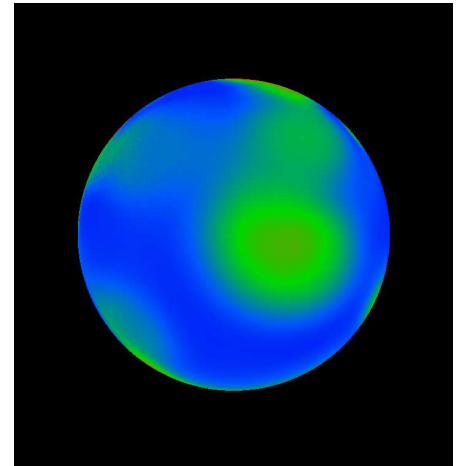
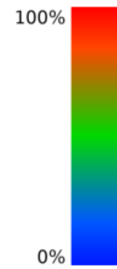
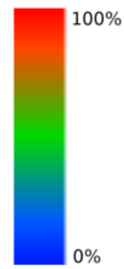
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

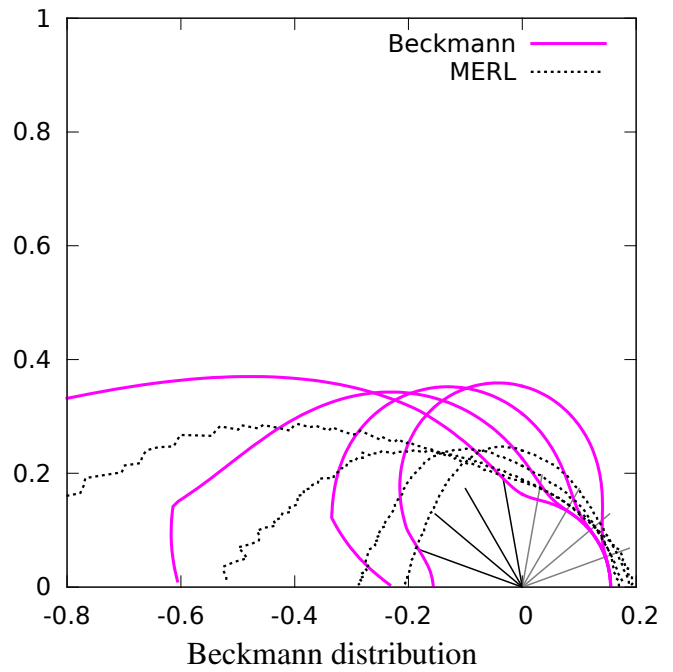
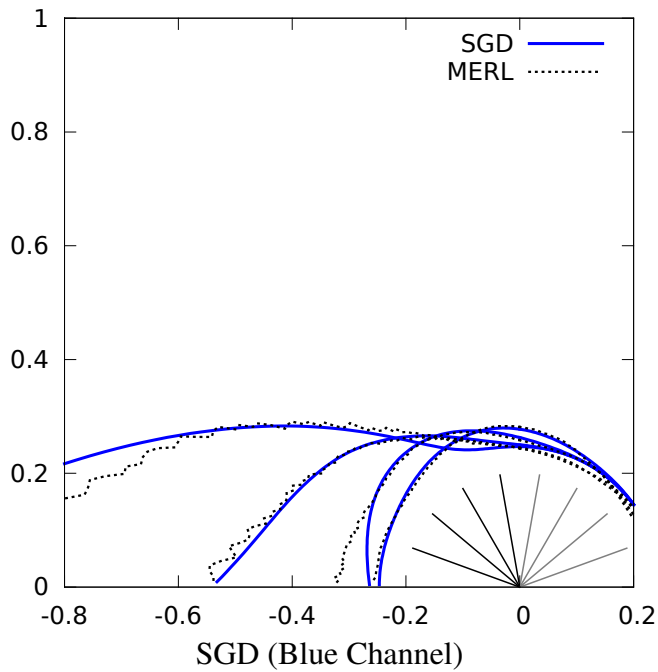
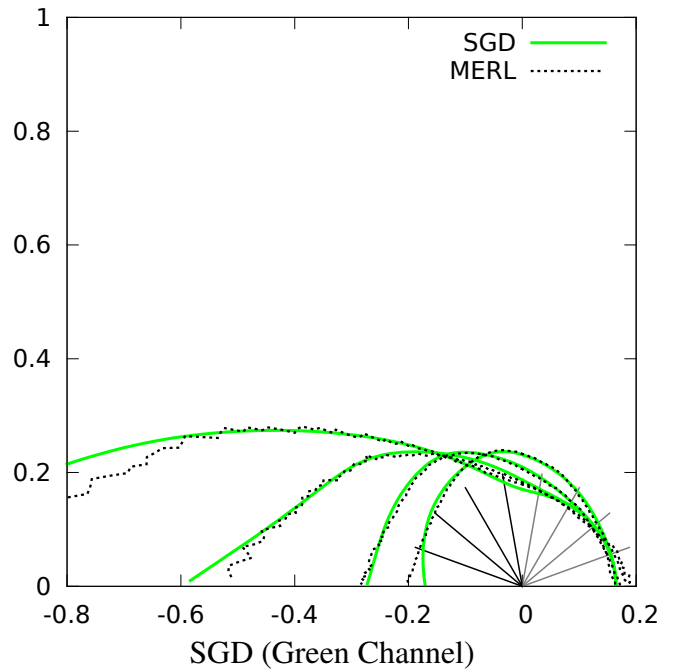
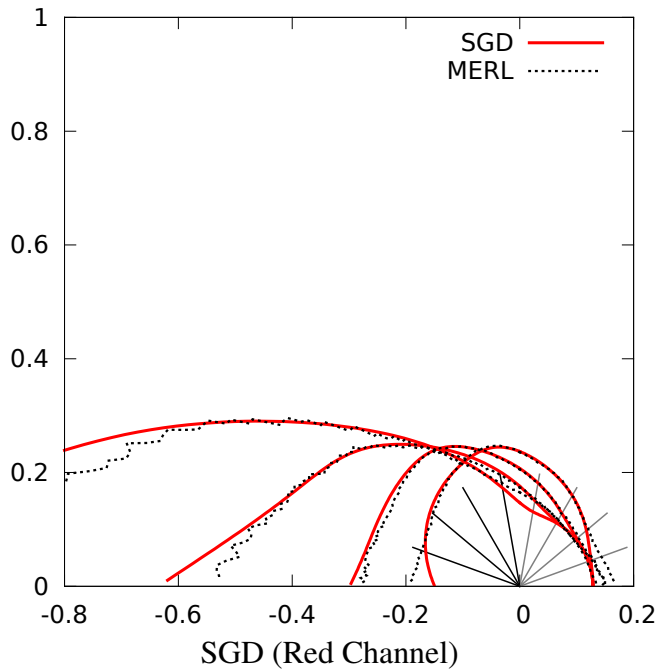
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00665057	0.231099	0.130681	0.238562	0.112486	0.0662142	8.0828	0.000406243
Green	0.0139696	0.18931	0.112103	0.17	0.106018	0.0682314	9.4312	0.000291986
Blue	0.0472605	0.12528	0.0629285	0.0157371	0.139316	0.10607	16.8231	0.000555778

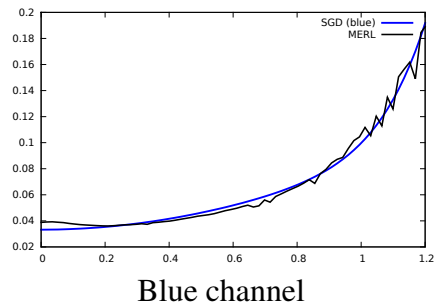
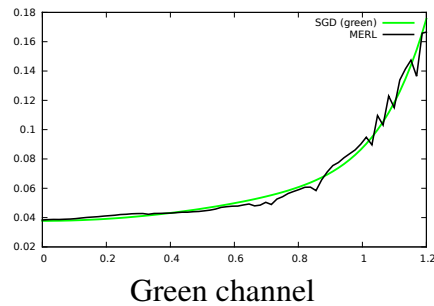
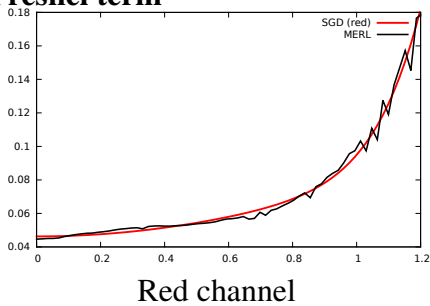
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.05526	0.00104743	14.347	0.11894
Green	4.09607	0.0035546	13.928	0.226752
Blue	4.54368	0.10813	13.5626	0.524826

BRDF lobes in the incidence plane (Cubic root applied)

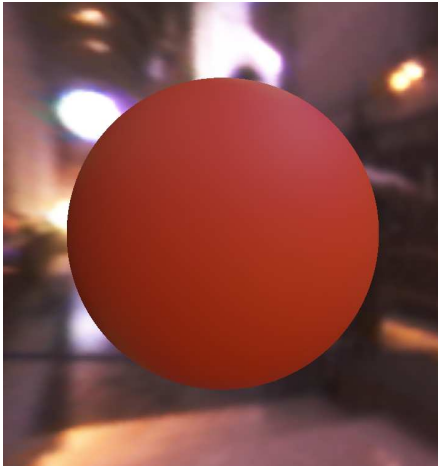


Fresnel term



Material Name: *dark-red-paint*

Rendered Images



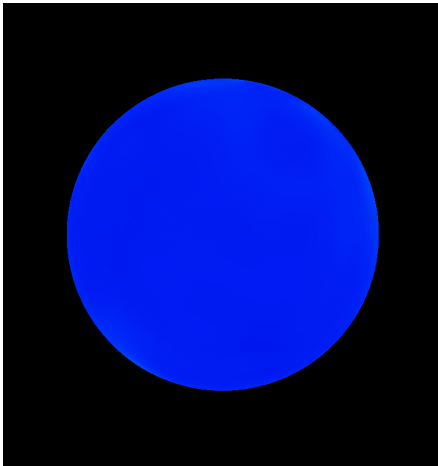
SGD



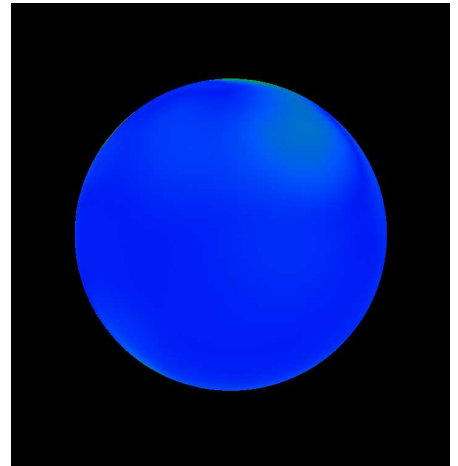
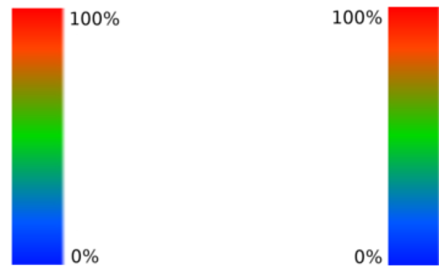
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

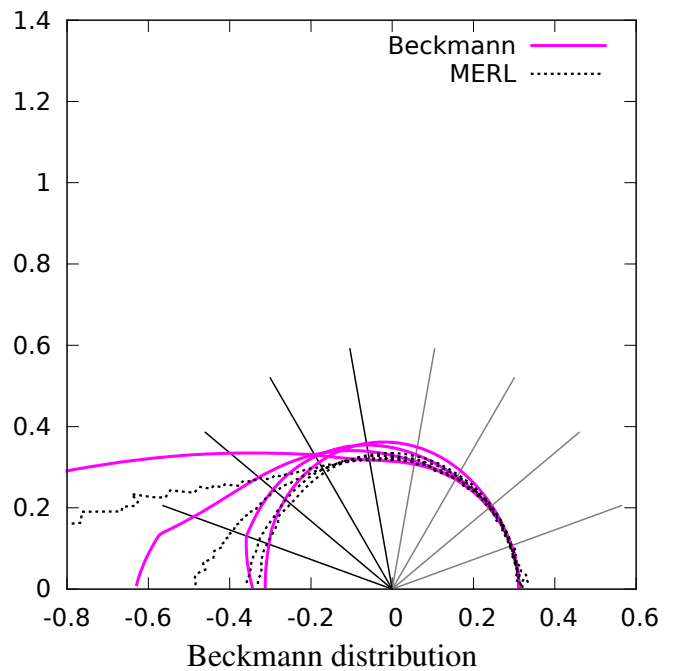
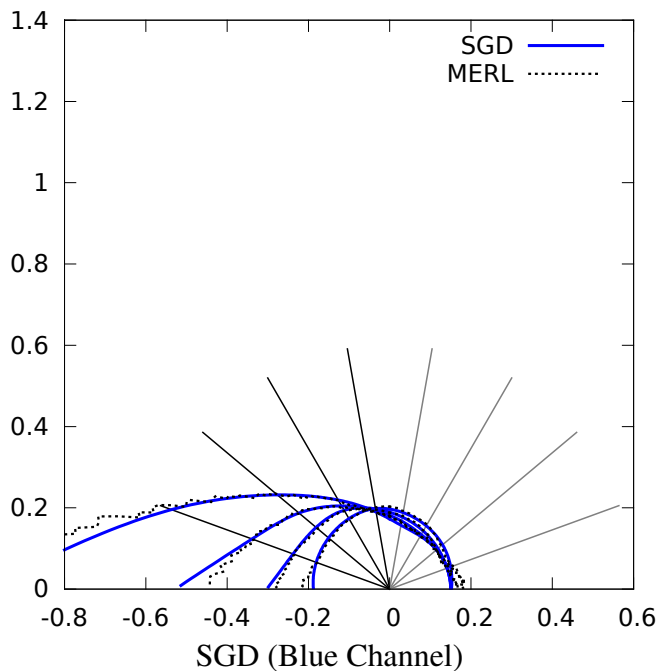
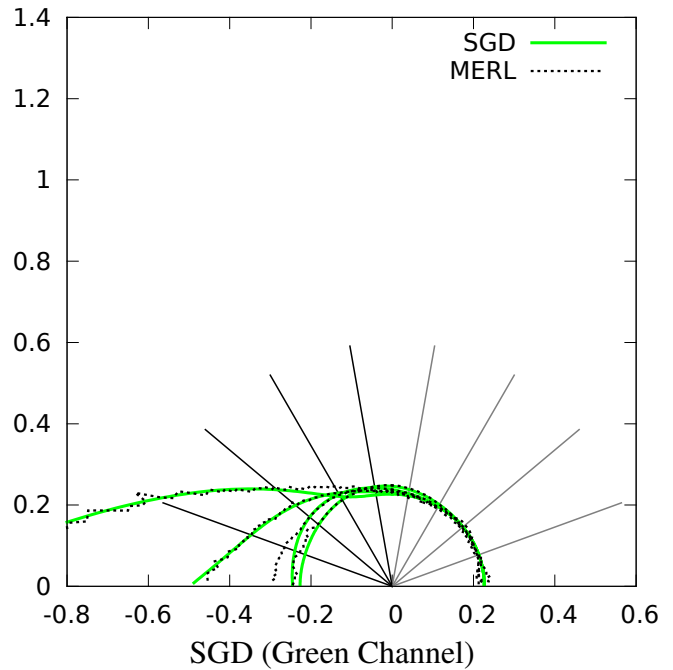
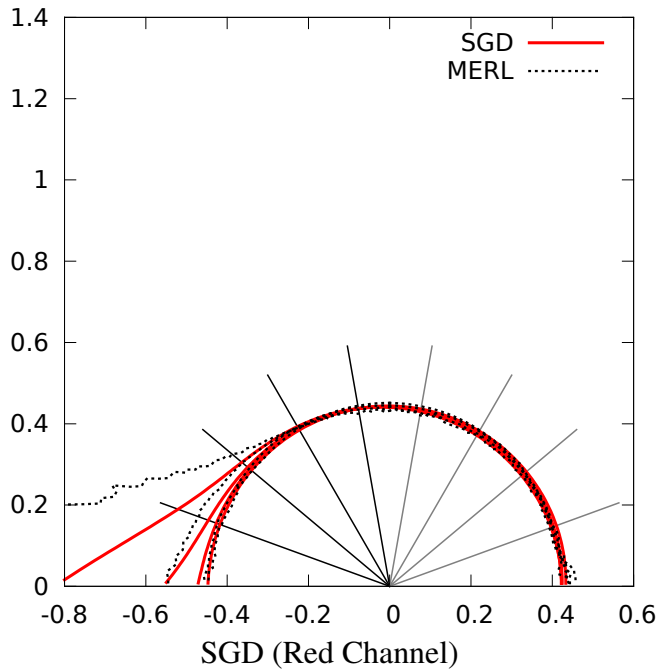
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.237125	0.227405	0.67372	1.38127	1.56101e-11	-0.148315	3.95965	0.00155397
Green	0.0365577	0.111055	0.0706716	1.4345e-13	0.0779523	0.0560349	15.1861	0.000508377
Blue	0.0106149	0.150433	0.20328	0.27723	0.136566	0.0961999	5.71355	0.000218865

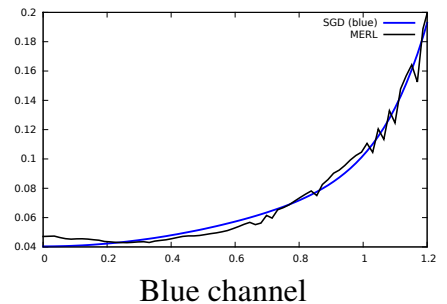
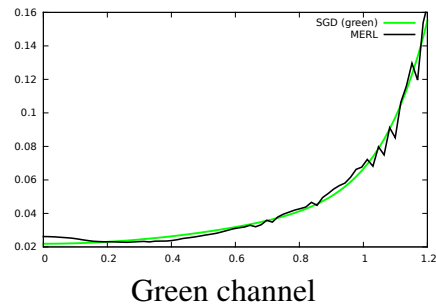
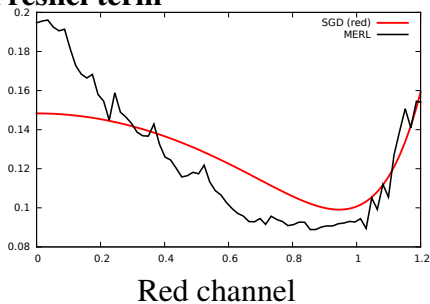
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.27942	0.0225467	7.45998	0.119045
Green	4.30359	0.113039	12.679	0.521154
Blue	3.20838	0.00667899	10.9071	0.166378

BRDF lobes in the incidence plane (Cubic root applied)

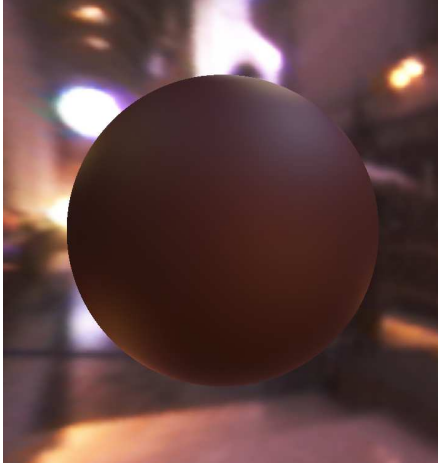


Fresnel term



Material Name: *dark-specular-fabric*

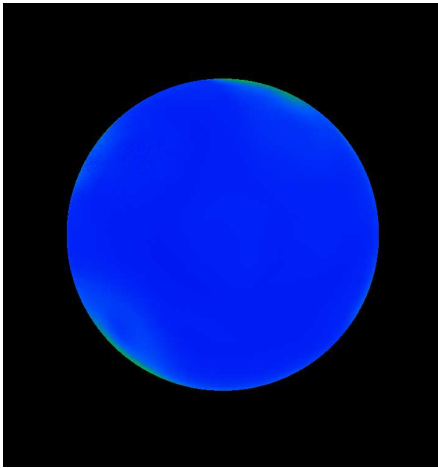
Rendered Images



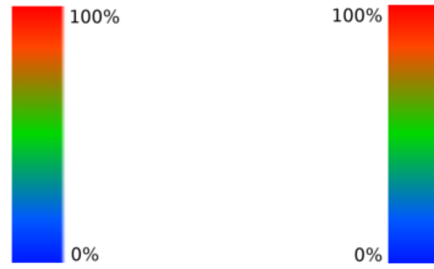
SGD



Reference



SGD (Lab difference)



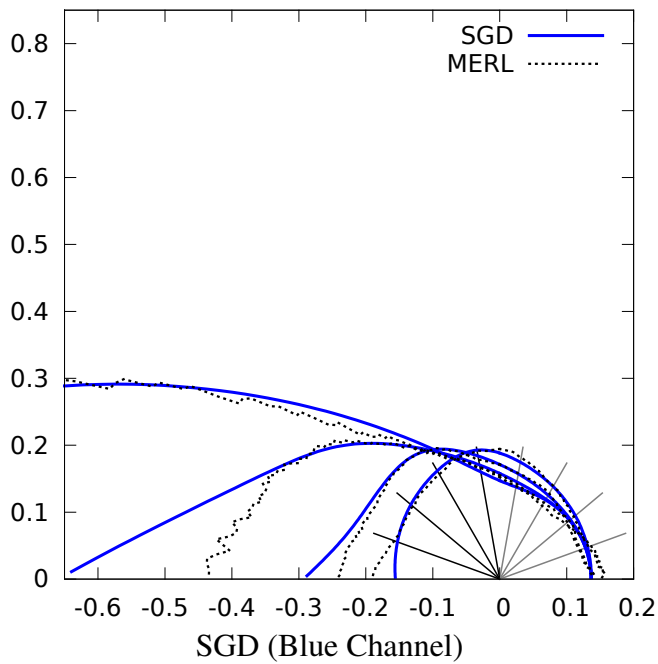
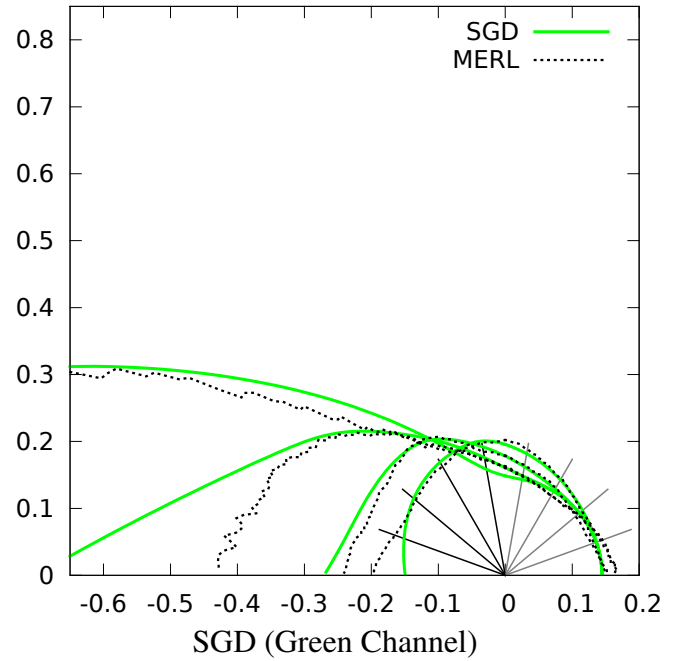
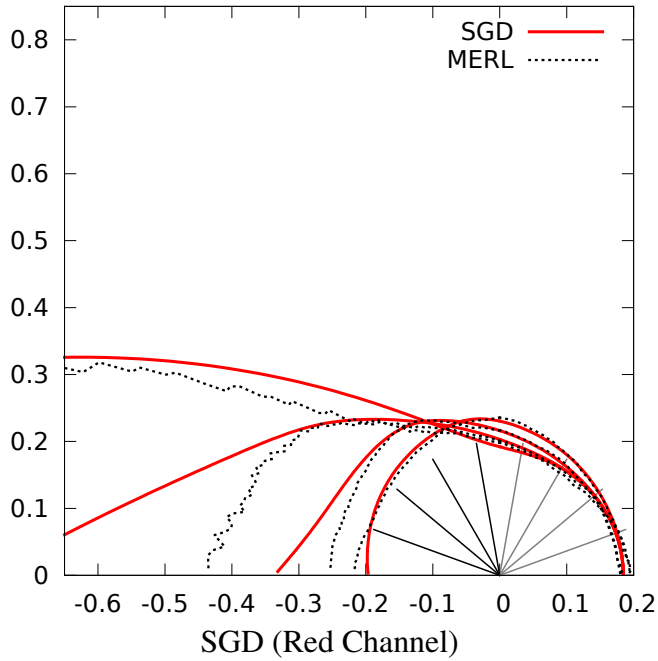
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0197229	0.556218	0.140344	0.249059	0.0351133	0.0243153	7.60492	0.00158681
Green	0.00949167	0.401495	0.106541	0.177611	0.0387177	0.0293178	9.81673	0.000974676
Blue	0.00798414	0.378651	0.166715	0.434167	0.0370533	0.0264913	6.19307	0.000638865

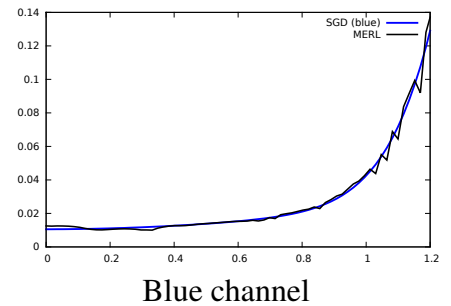
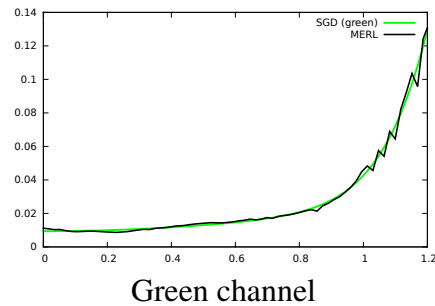
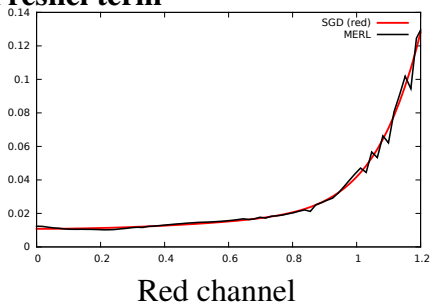
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.93869	0.00122421	13.889	0.114655
Green	4.23097	0.00238545	14.5743	0.210179
Blue	4.3775	8.47126e-06	17.2049	-0.227628

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

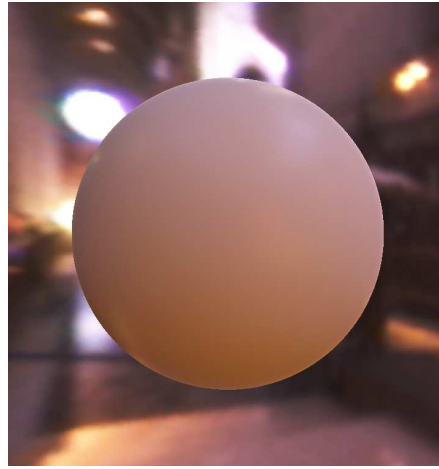


Material Name: *delrin*

Rendered Images



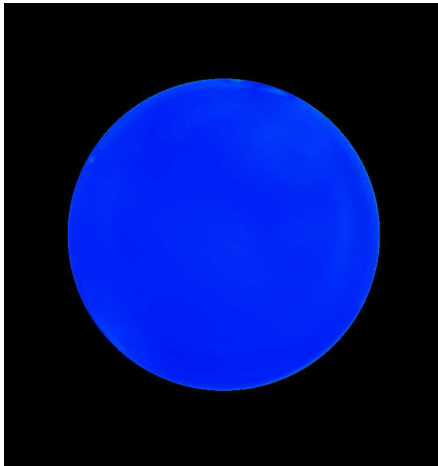
SGD



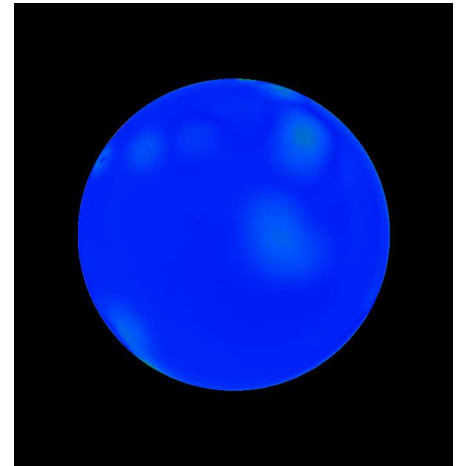
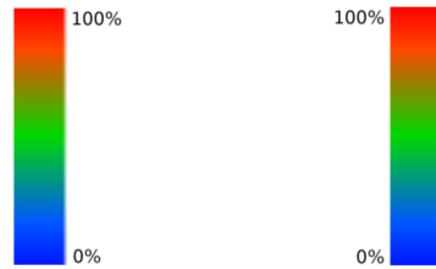
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

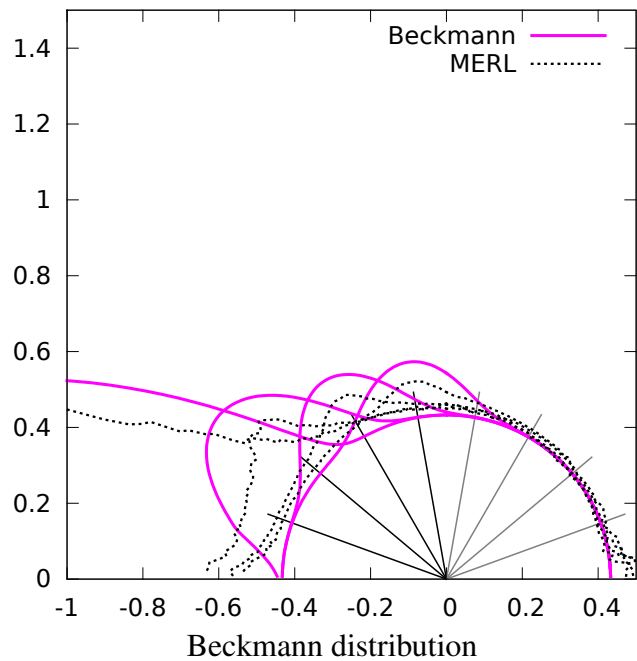
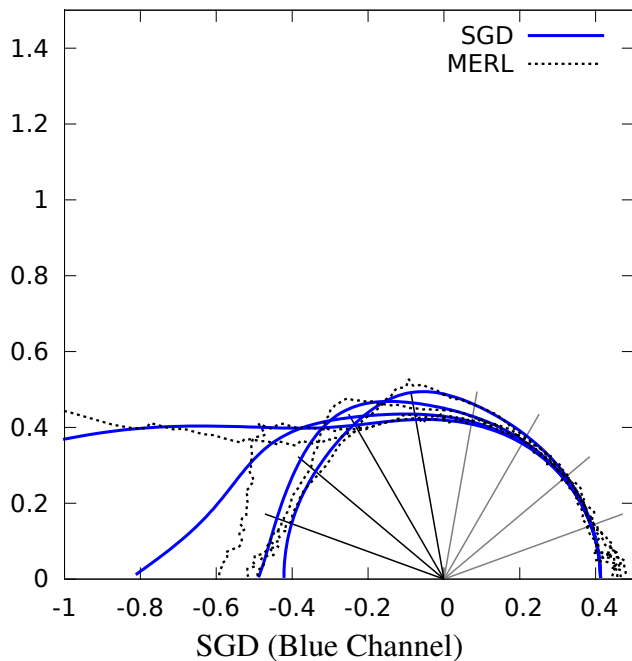
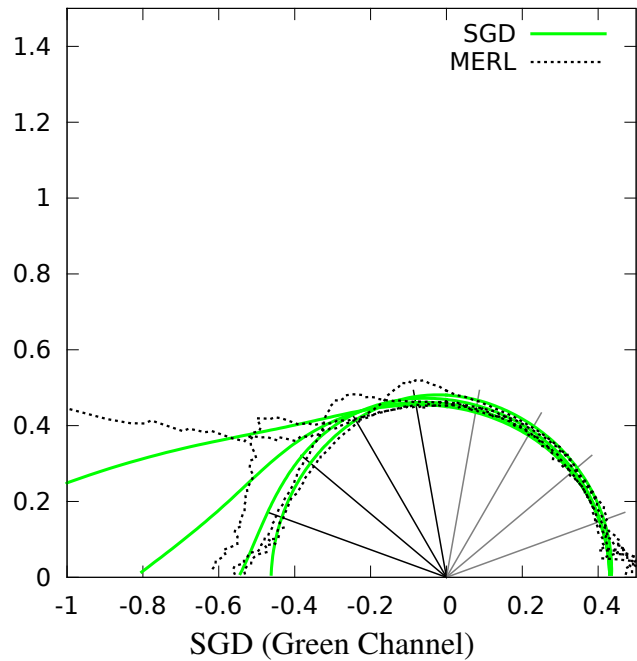
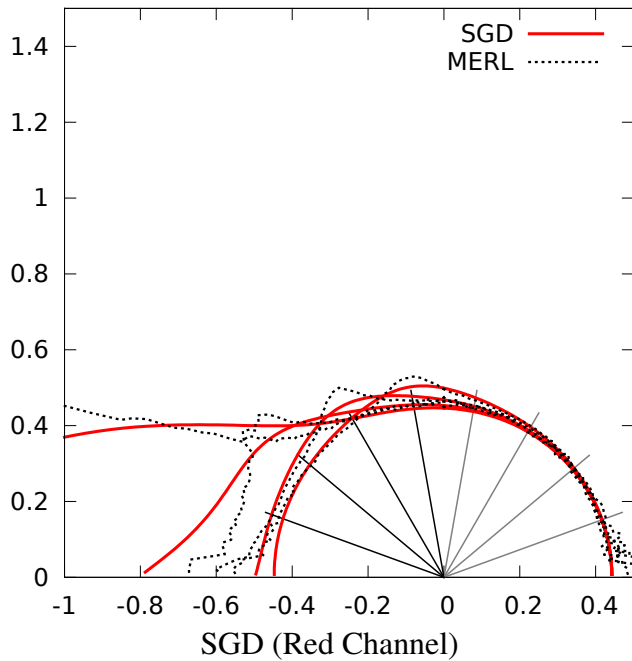
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.272703	0.536593	0.176535	0.762088	0.0398465	-0.0121332	5.02017	0.00493658
Green	0.249805	0.727886	0.344018	0.823603	0.0430719	-0.0255915	3.78669	0.00655617
Blue	0.220642	0.64011	0.208011	0.85976	0.0290162	-0.0305128	4.39454	0.00422698

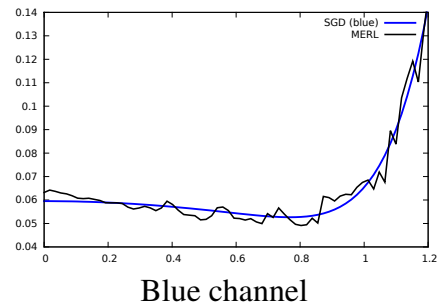
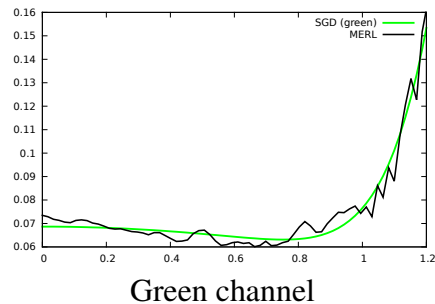
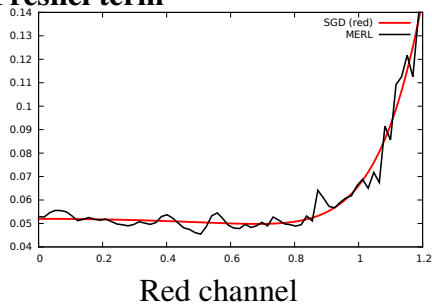
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.44325	9.20654e-08	21.2534	-0.438862
Green	3.49289	0.000215686	12.5556	-0.184248
Blue	3.48886	1.06338e-07	20.455	-0.478699

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *fruitwood-241*

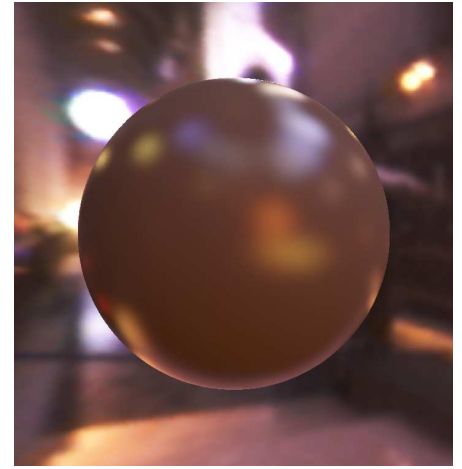
Rendered Images



SGD



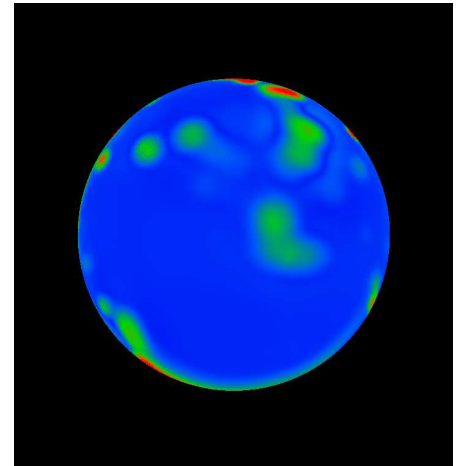
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

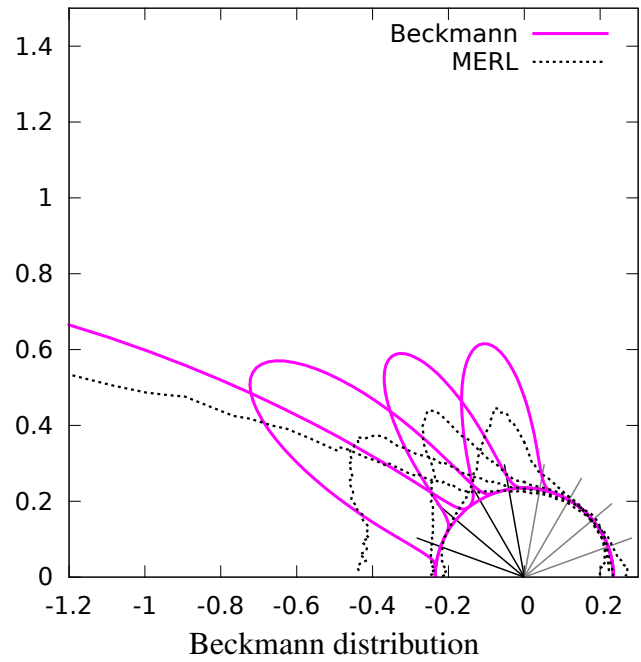
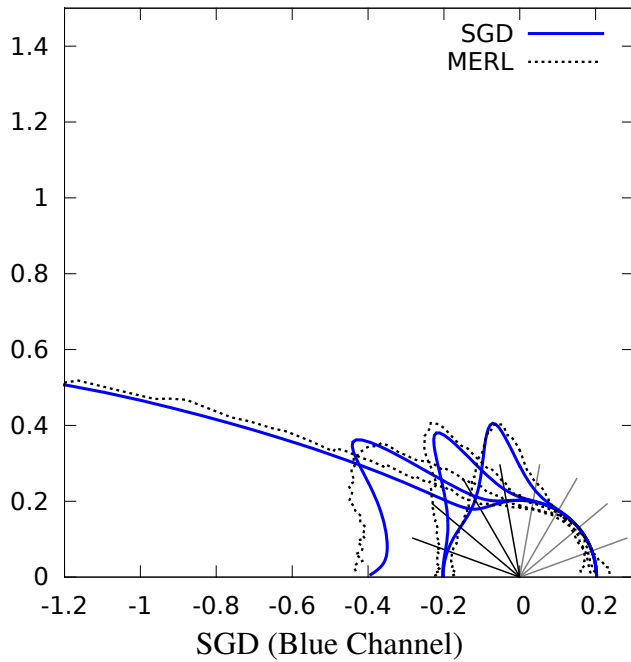
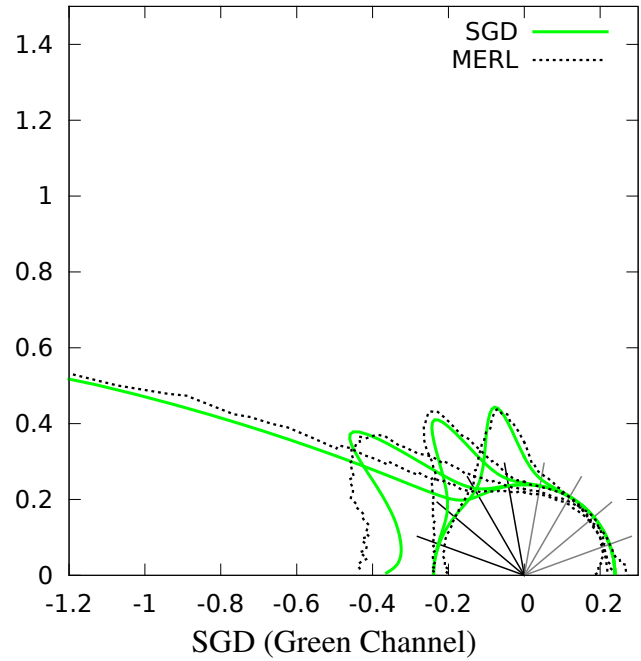
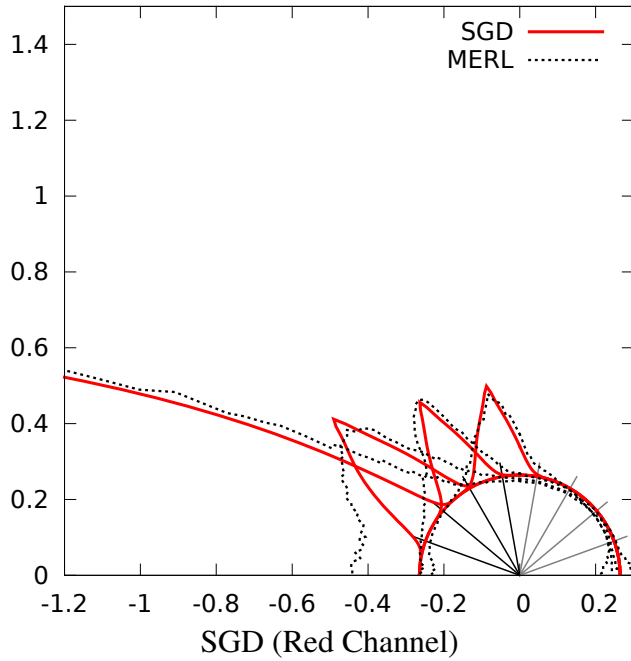
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0580445	0.203894	0.00824986	0.160382	0.00129482	-0.0211778	110.054	0.00493613
Green	0.0428667	0.233494	0.0534794	1.07206	0.00689891	-0.0140791	6.98485	0.00460352
Blue	0.0259801	0.263882	0.0472951	0.768335	0.01274	-0.00665974	11.6203	0.00373027

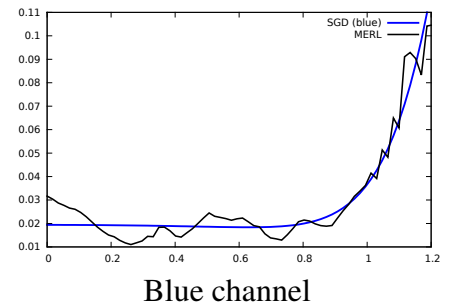
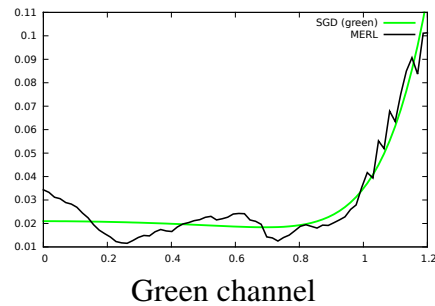
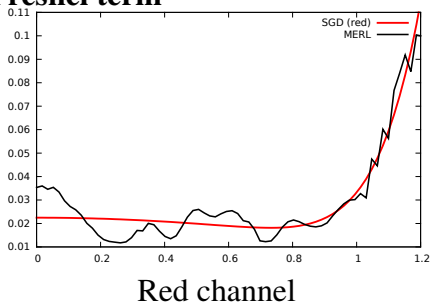
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.74678	162.121	32.6966	0.765181
Green	1.31986	1.18843e-07	36.752	0.0514459
Blue	1.76021	1.0331e-07	34.371	0.0106852

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *gold-metallic-paint2*

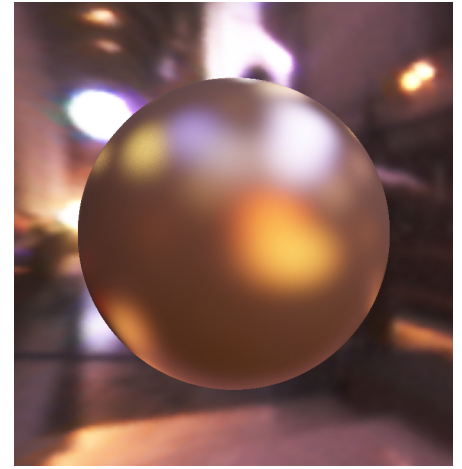
Rendered Images



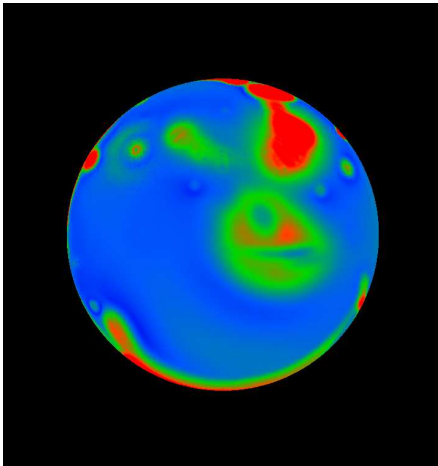
SGD



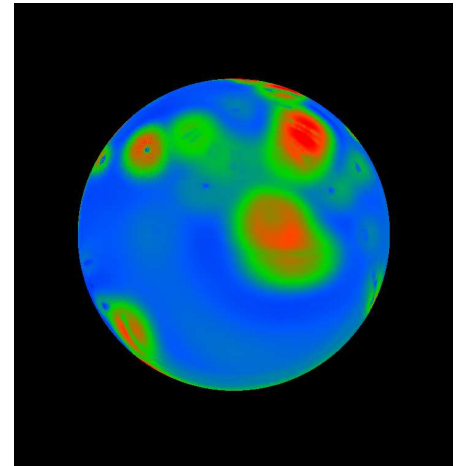
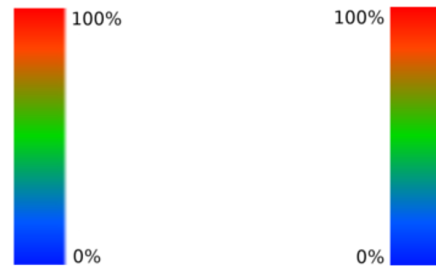
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

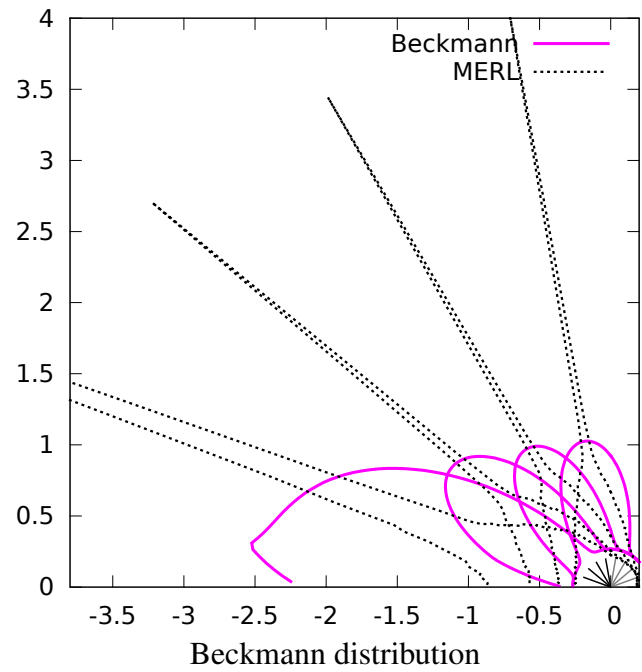
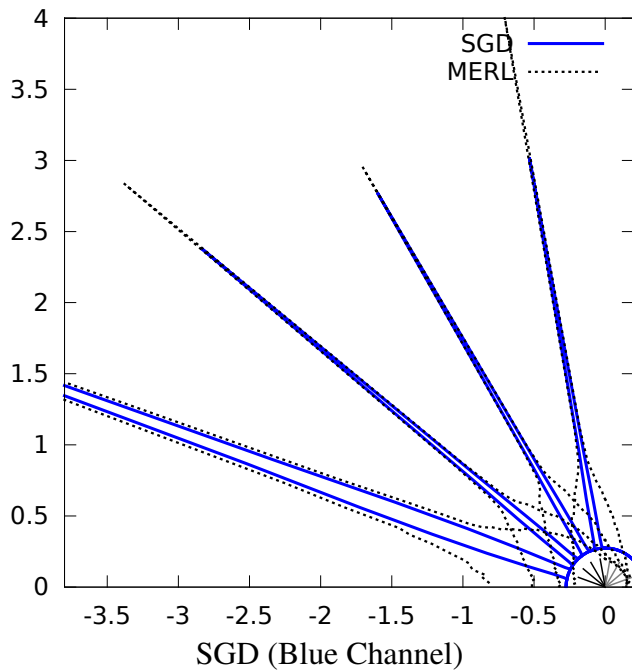
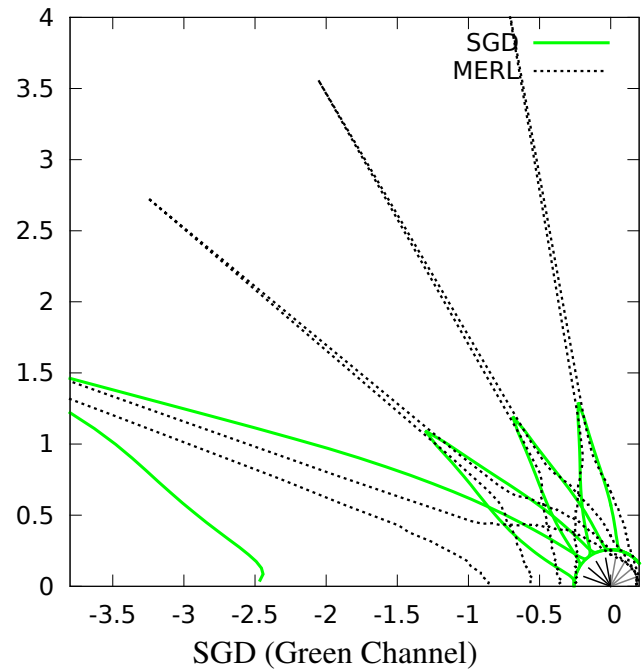
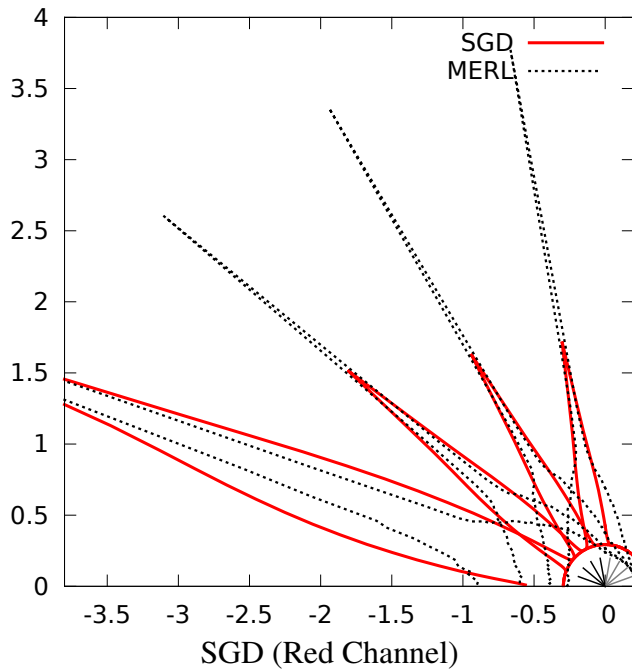
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0796008	0.633627	0.00376608	0.415684	0.0343265	-0.00929705	181.769	0.117145
Green	0.0538361	1.77116	0.00871206	0.368424	0.00330259	-0.0219437	85.527	0.17457
Blue	0.0649523	0.0564028	0.000572055	0.623038	4.15759e-12	-0.0596944	795.042	0.0754722

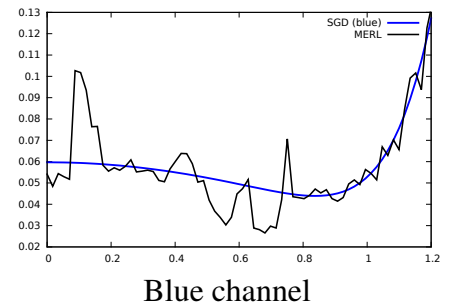
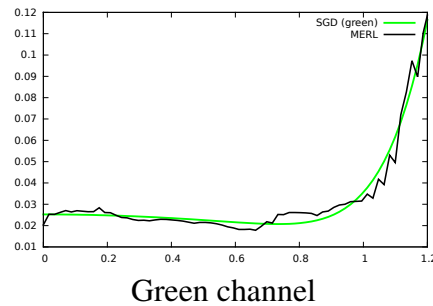
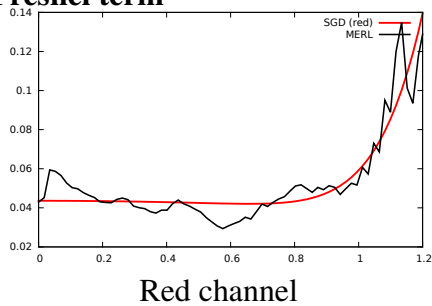
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.77279	4.78294e-08	83.871	0.365256
Green	3.50114	9.8399e-08	57.2291	0.276734
Blue	0.985212	4.45358e-08	216.537	0.491264

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *gold-metallic-paint3*

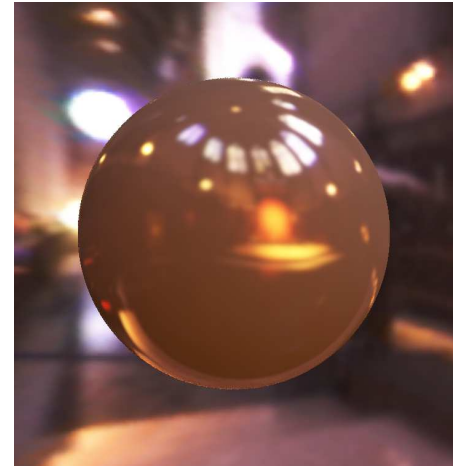
Rendered Images



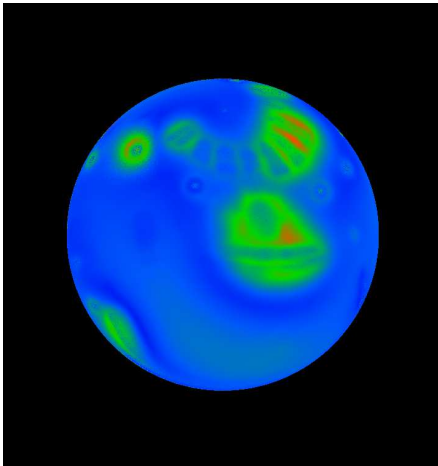
SGD



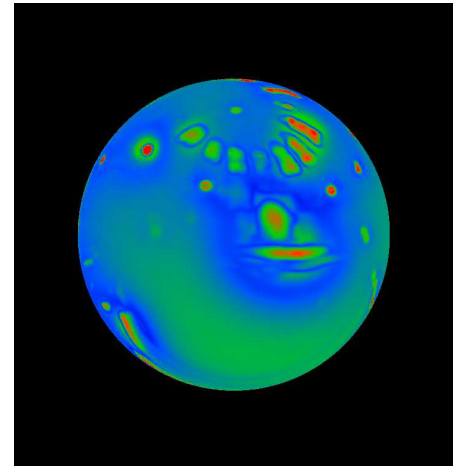
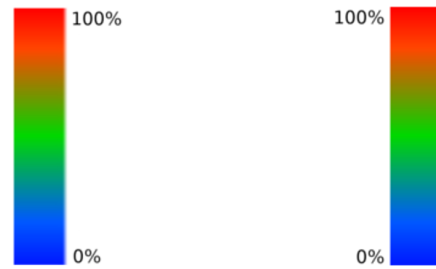
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

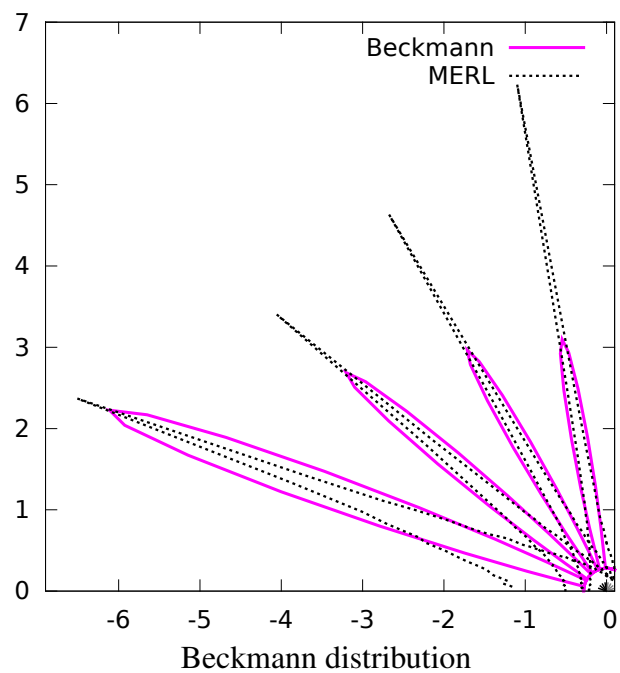
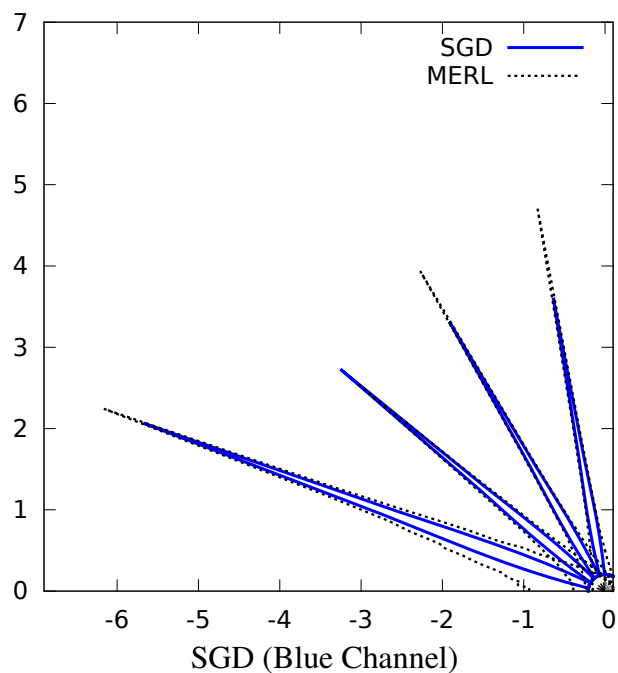
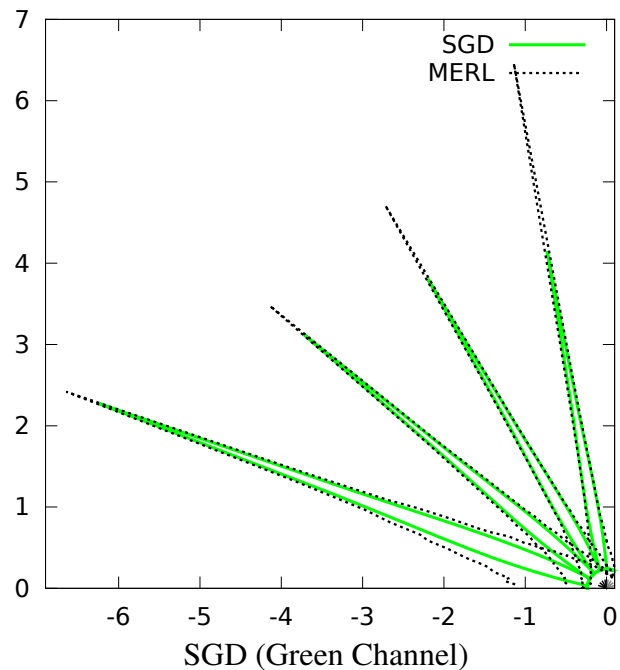
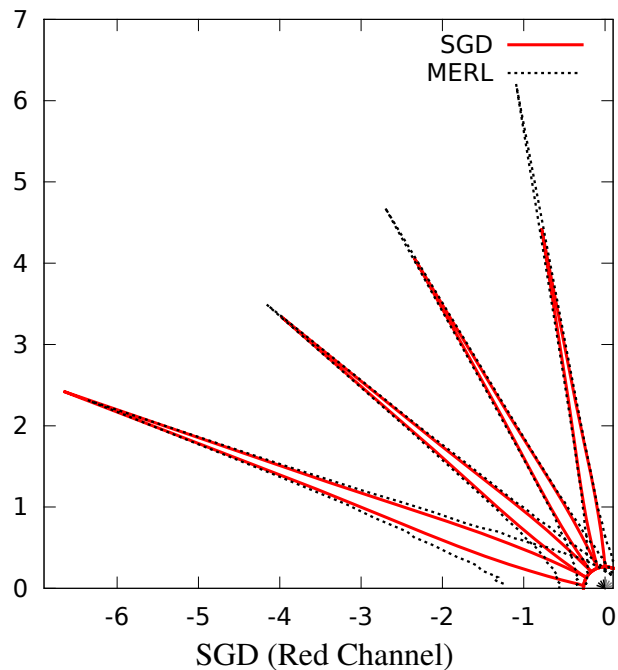
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0579212	0.0729896	0.00146432	0.529437	1.84643e-14	-1	382.887	0.116233
Green	0.0416649	0.0597695	0.00156513	0.551234	5.7212e-15	-1	345.197	0.0897222
Blue	0.0271208	0.037684	0.000977438	0.504486	8.68546e-13	-0.648897	593.725	0.0711514

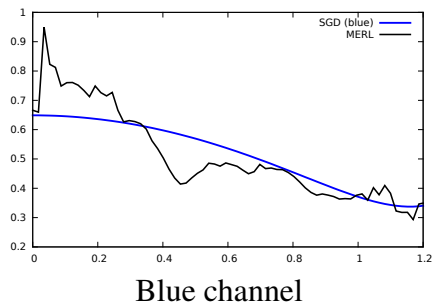
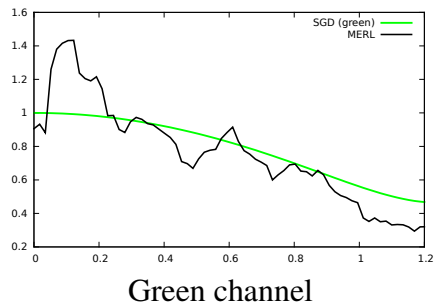
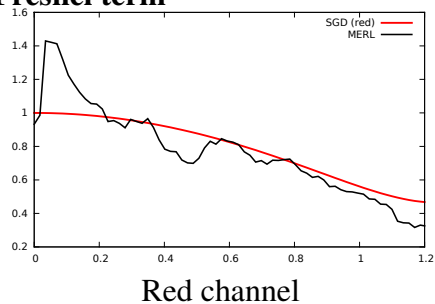
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.97078e-07	3.98586e-07	22.0196	-0.634103
Green	1.12888e-06	3.69533e-07	22.6462	-0.588056
Blue	4.15366e-07	16.0596	11.7126	0.578355

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *gold-metallic-paint*

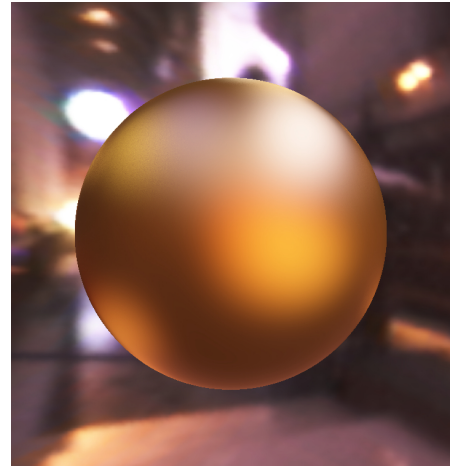
Rendered Images



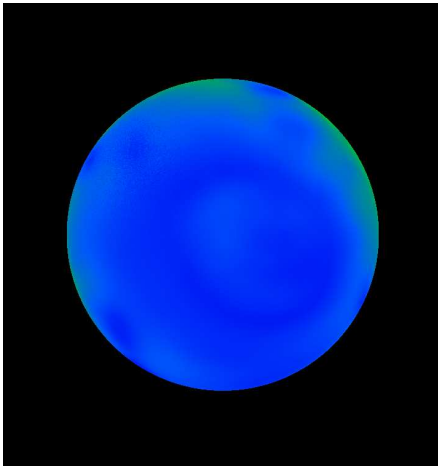
SGD



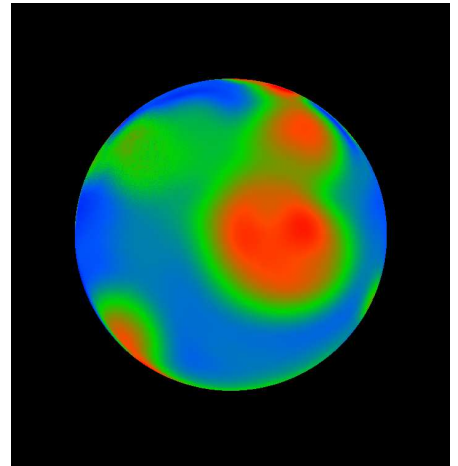
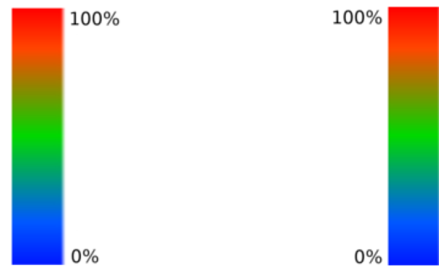
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

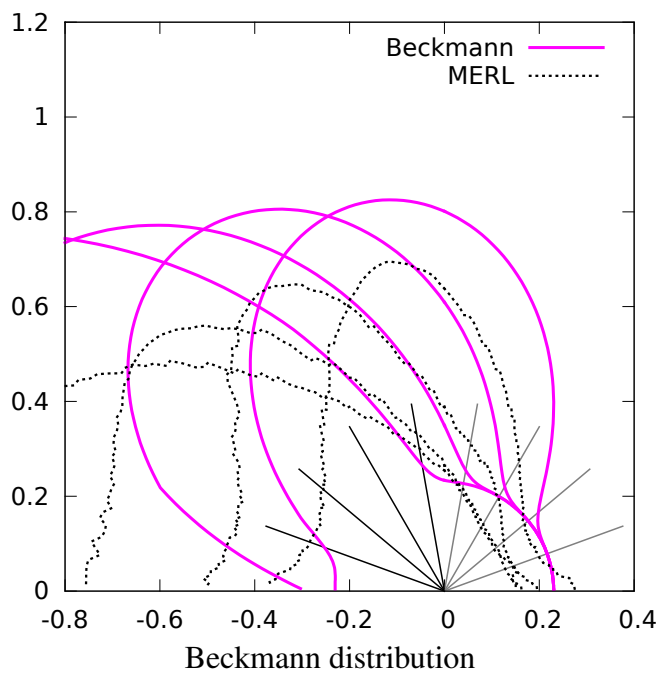
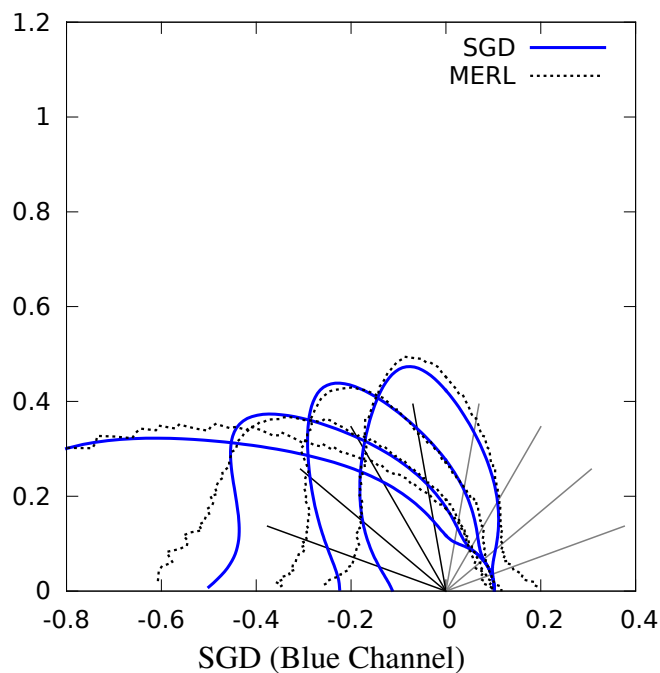
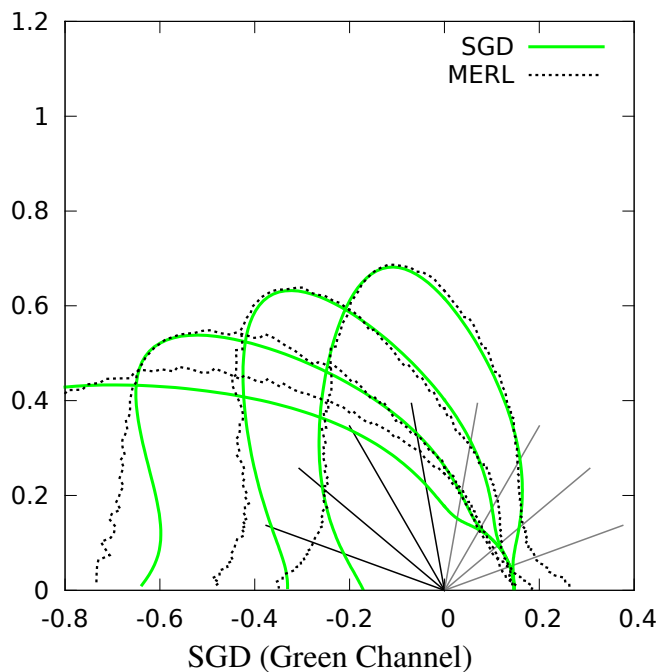
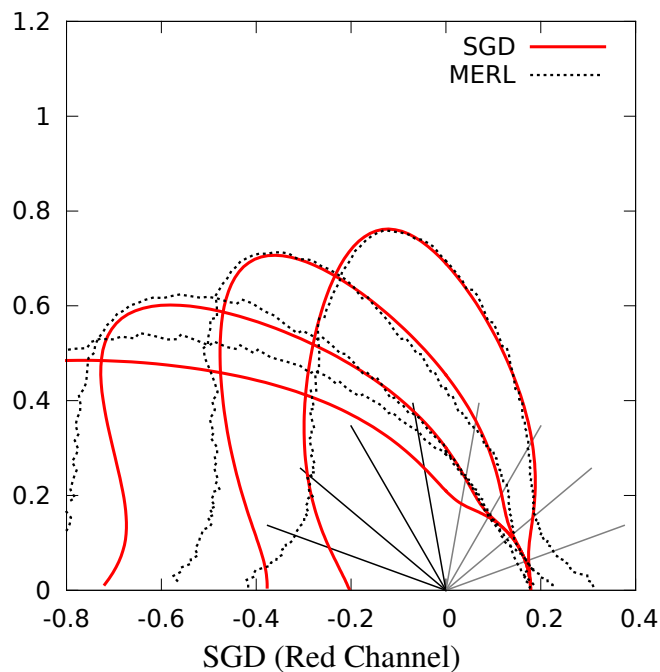
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0178625	0.17127	0.127954	0.781093	1.00776e-12	-1	5.90039	0.0095612
Green	0.00995704	0.120714	0.127825	0.795517	1.22243e-15	-1	5.83556	0.00483452
Blue	0.00335044	0.115473	0.109623	0.661313	6.18432e-13	-0.334497	7.14985	0.00145599

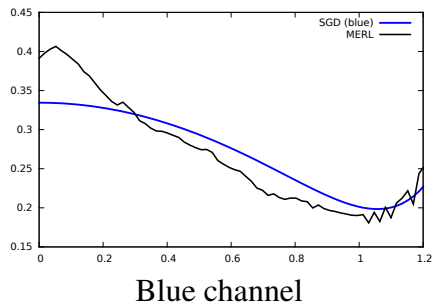
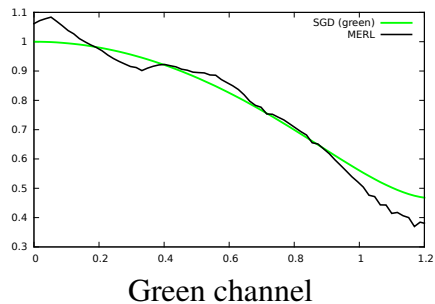
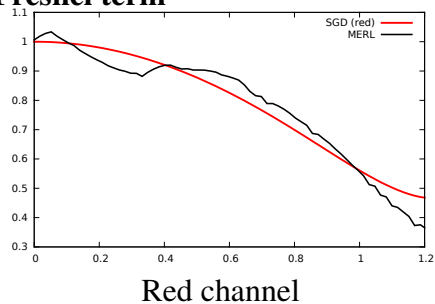
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.7548	9.46481e-08	23.8811	-0.303345
Green	2.7057	1.06951e-07	23.9059	-0.293778
Blue	2.94348	1.10733e-07	24.2972	-0.267019

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *gold-paint*

Rendered Images



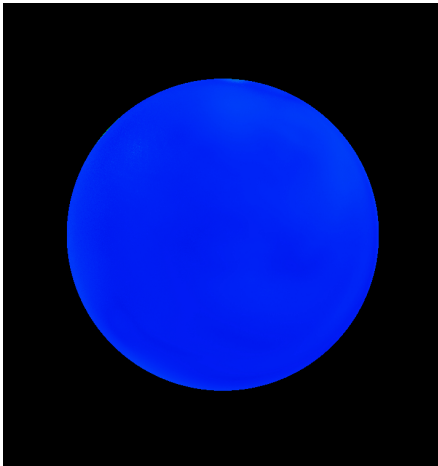
SGD



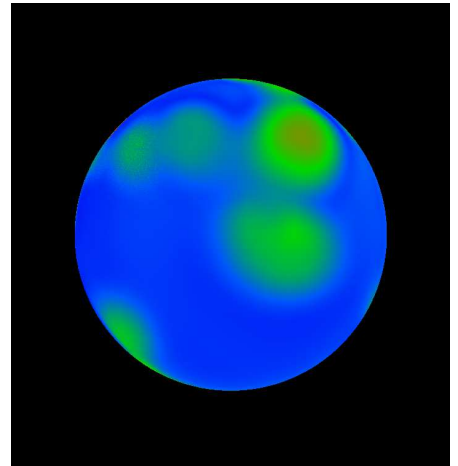
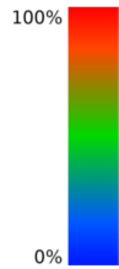
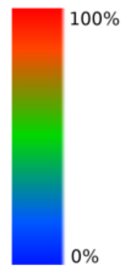
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

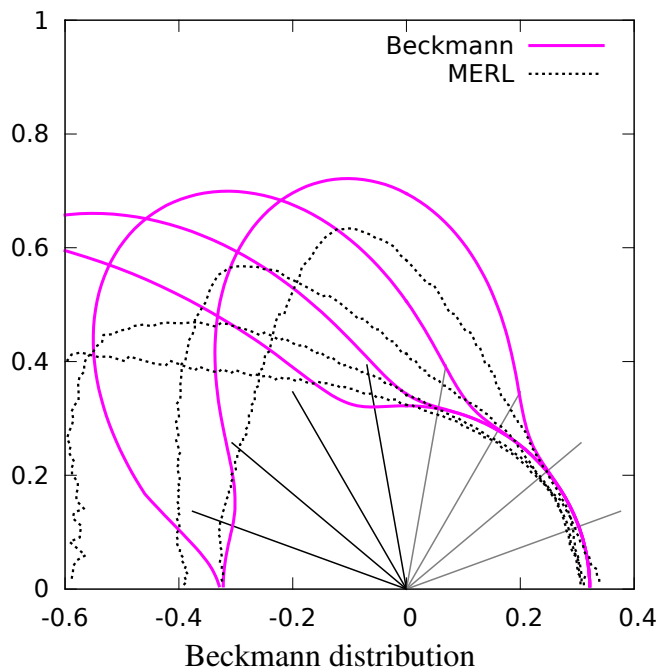
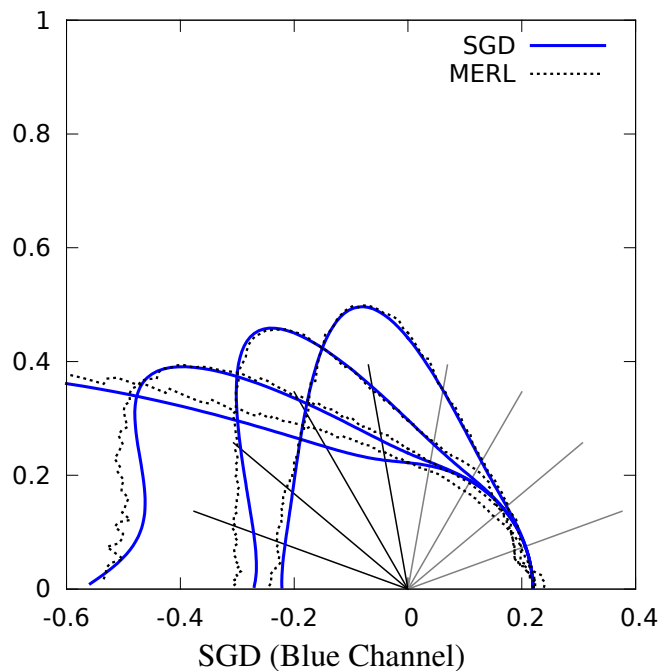
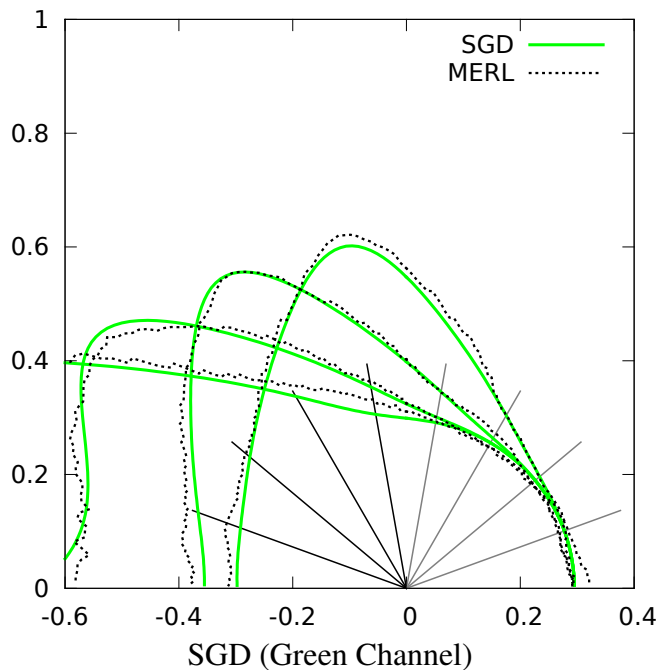
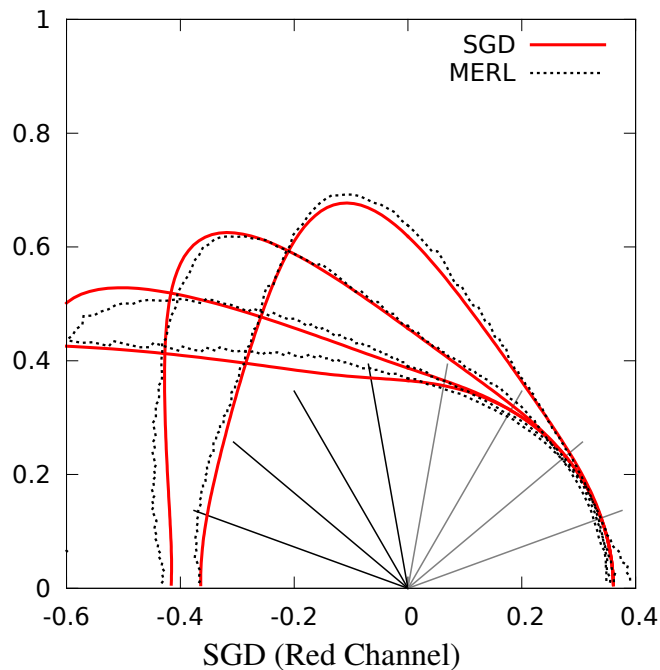
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.147708	0.160592	0.122506	0.795078	9.16095e-12	-0.596835	5.98176	0.00313716
Green	0.0806975	0.217282	0.108069	0.637578	1.81225e-12	-0.331147	7.35539	0.00203922
Blue	0.033172	0.236425	0.12187	0.936117	0.0024589	-0.140729	5.29722	0.00165683

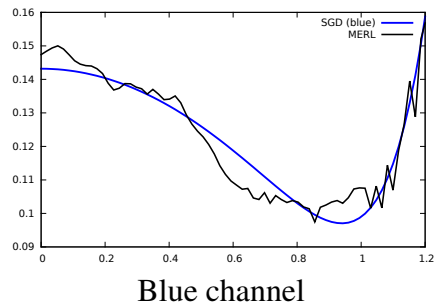
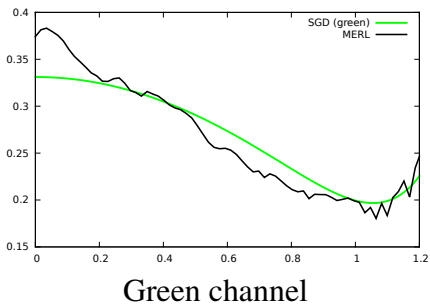
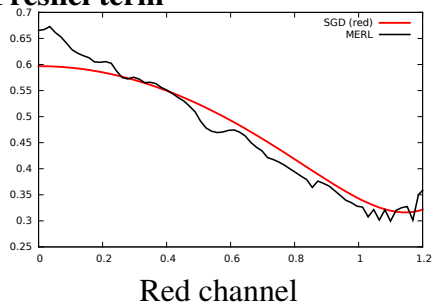
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.64832	9.3111e-08	24.3593	-0.284195
Green	3.04253	8.80143e-08	24.4037	-0.277297
Blue	2.3013	9.65288e-08	25.3623	-0.245352

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *gray-plastic*

Rendered Images



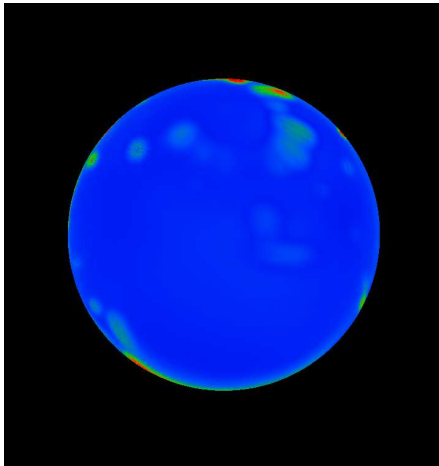
SGD



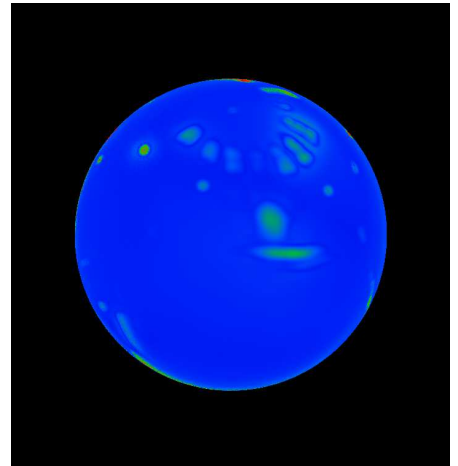
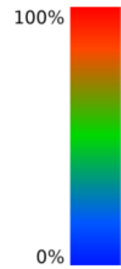
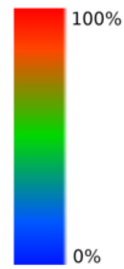
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

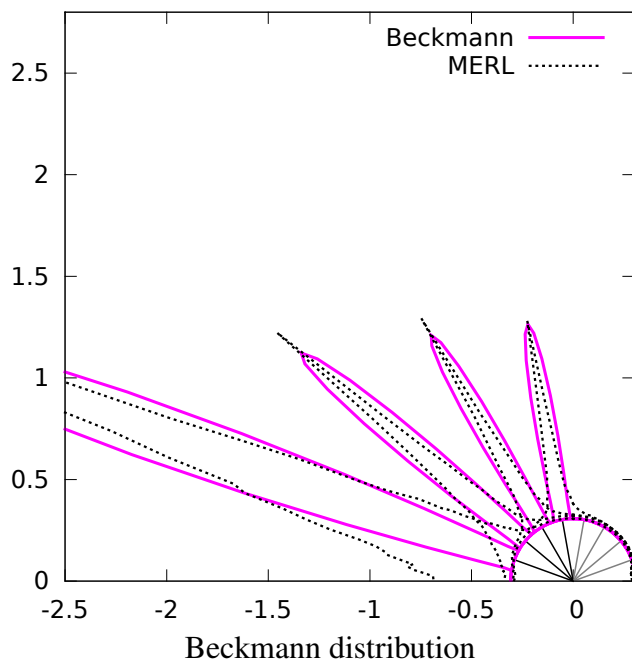
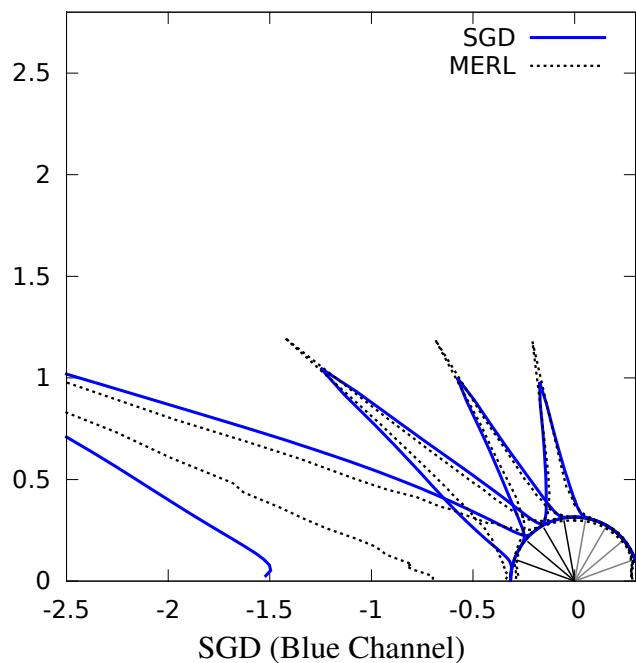
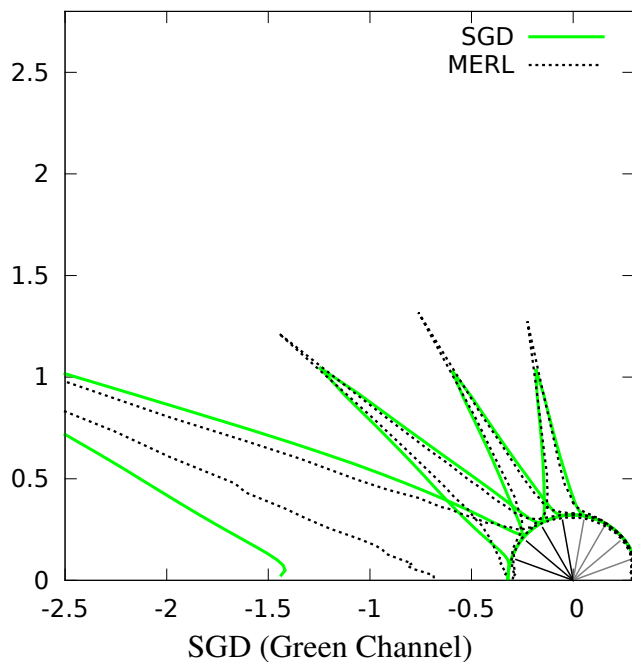
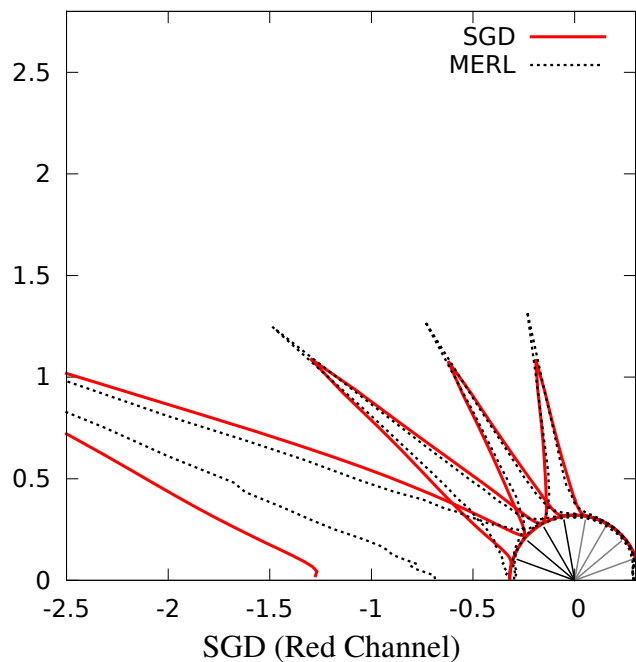
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.103233	0.494656	0.00758705	0.557908	0.0428175	0.0208304	75.6274	0.0512156
Green	0.104428	0.517207	0.00848095	0.556548	0.0438899	0.0221893	68.3098	0.050844
Blue	0.0983734	0.52772	0.00887135	0.545887	0.0569098	0.0375763	66.5689	0.0505763

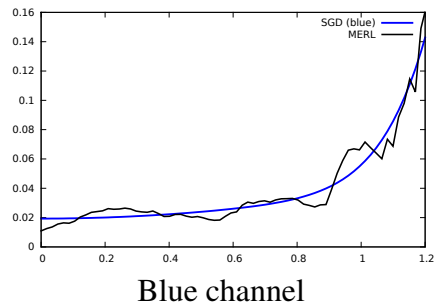
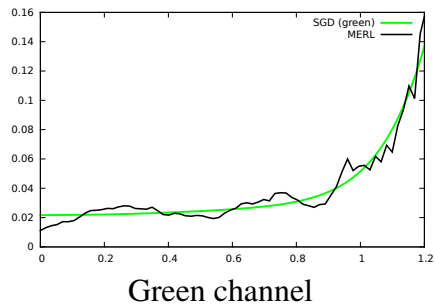
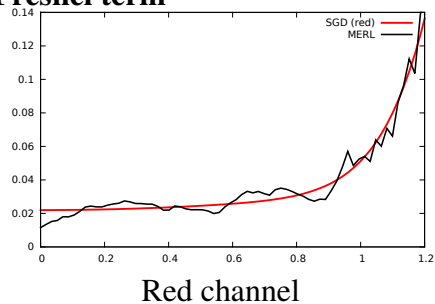
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.72111	1.06783e-07	65.6538	0.308907
Green	1.76597	5.31845e-08	63.2018	0.283768
Blue	1.8406	6.53296e-08	61.5805	0.280211

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *grease-covered-steel*

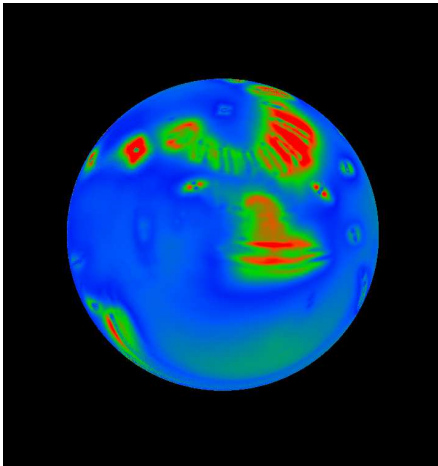
Rendered Images



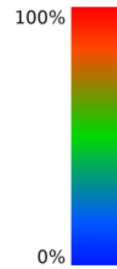
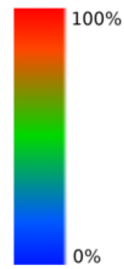
SGD



Reference



SGD (Lab difference)



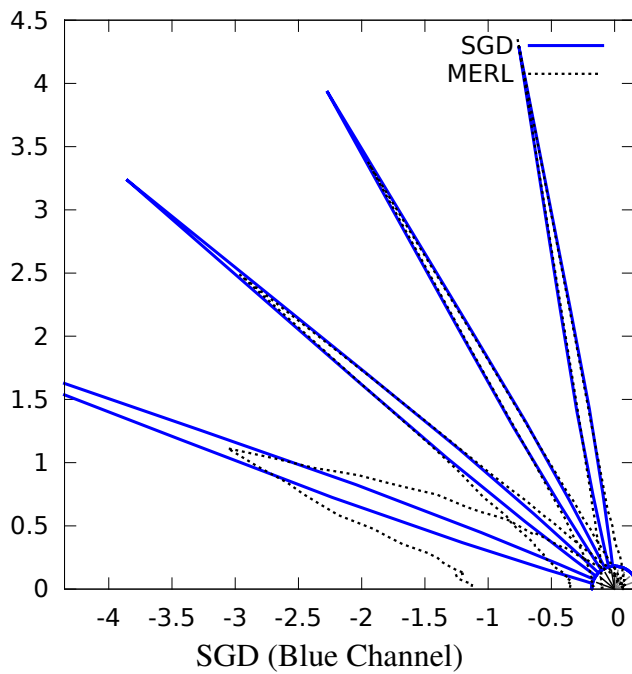
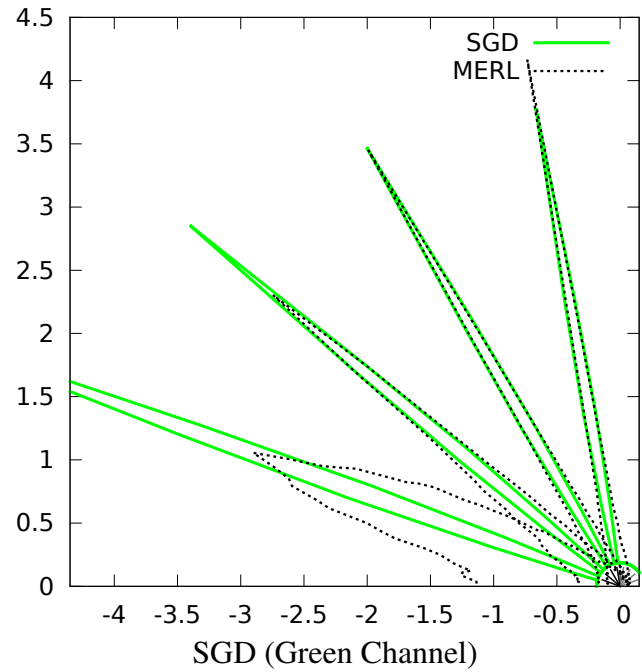
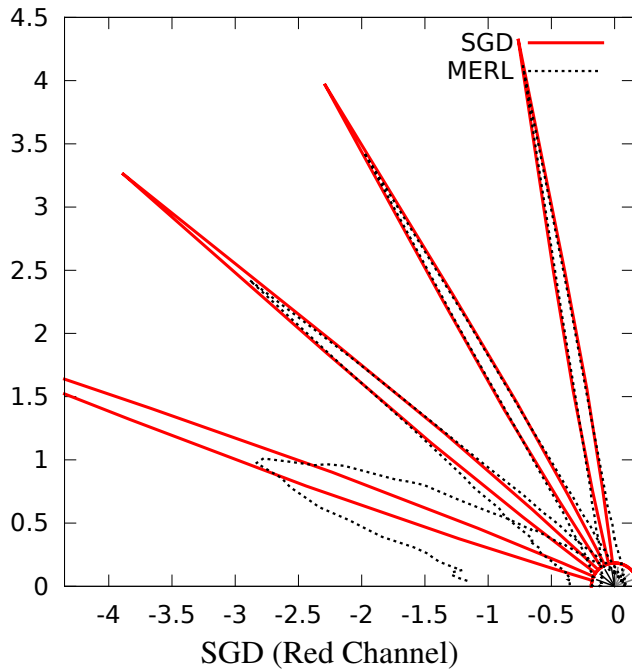
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0196306	0.0433721	0.00019081	0.164569	7.12672e-13	-1	4655.4	0.261184
Green	0.0200926	0.0311621	0.000173919	0.141125	1.06789e-14	-1	5210.63	0.20789
Blue	0.0187026	0.0326401	0.000217638	0.219421	1.61131e-13	-1	3877.45	0.210192

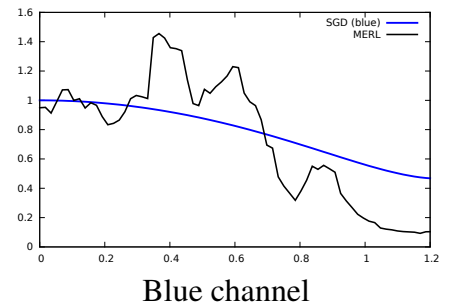
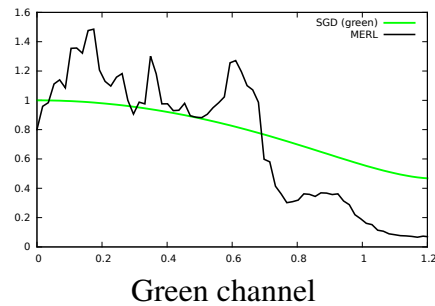
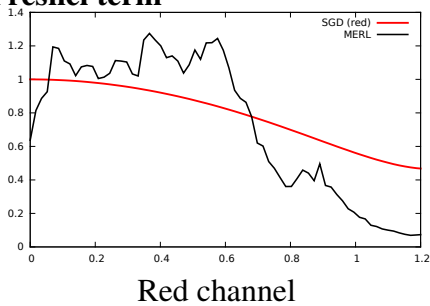
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	17.2827	2.26142e+43	103.46	1.20022
Green	29.2523	7.24862e+44	105.572	1.20678
Blue	8.54352	5.03774e+41	99.1097	1.19961

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *green-acrylic*

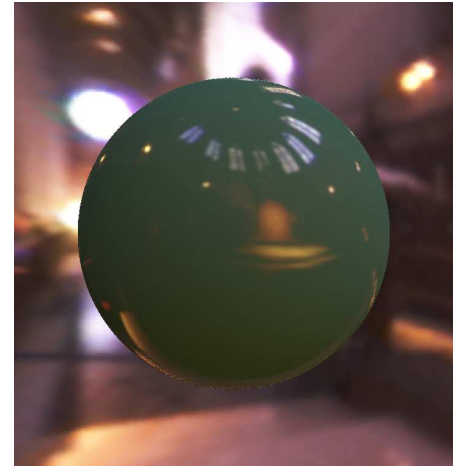
Rendered Images



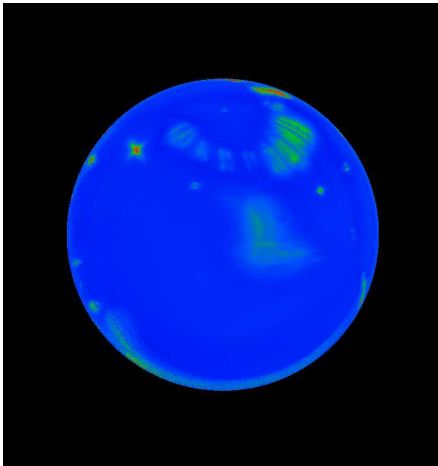
SGD



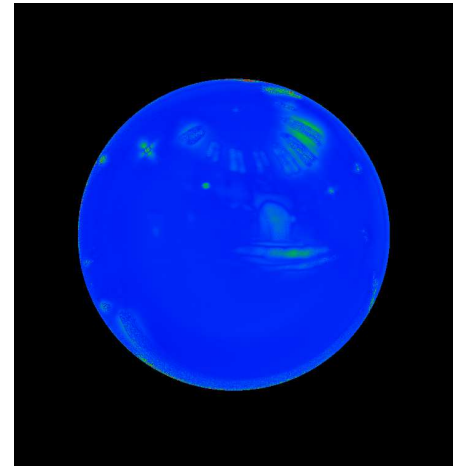
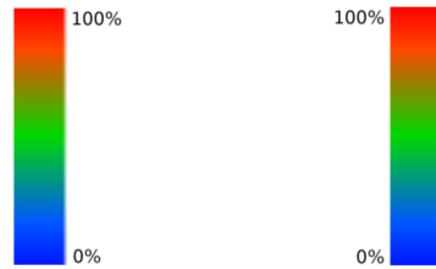
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

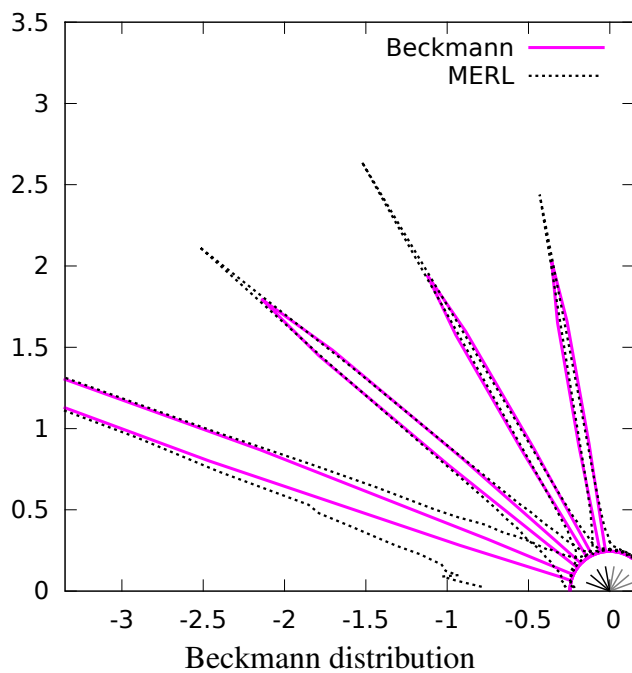
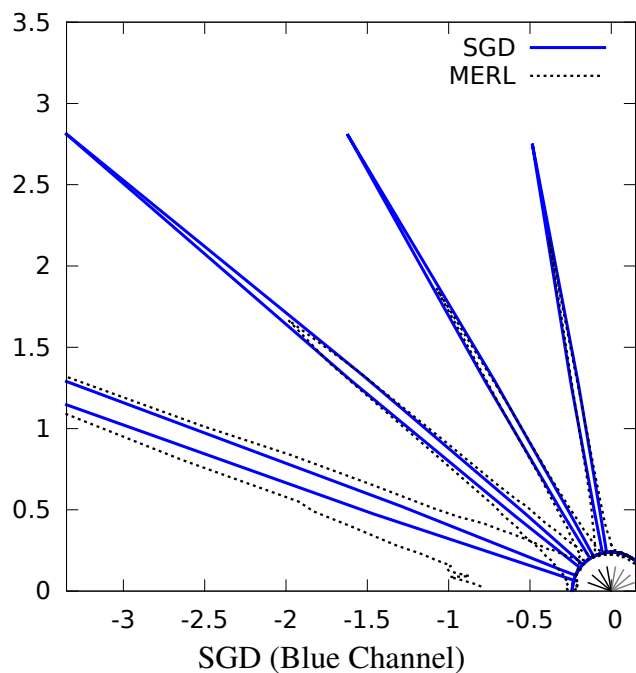
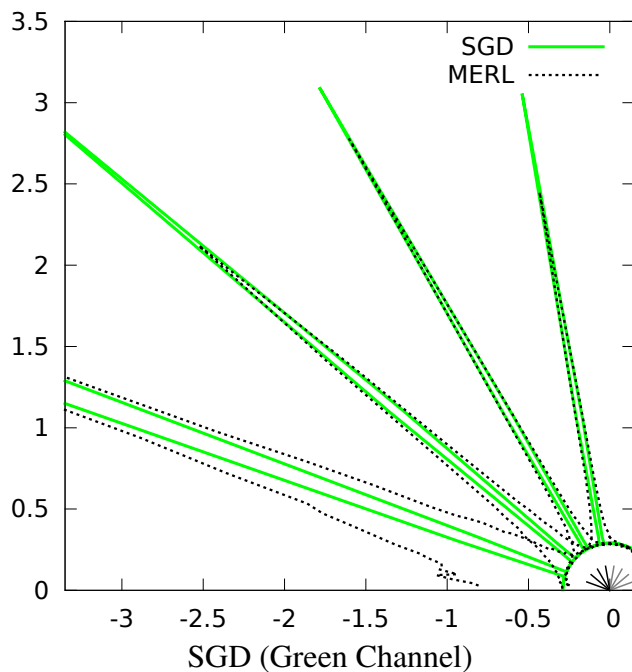
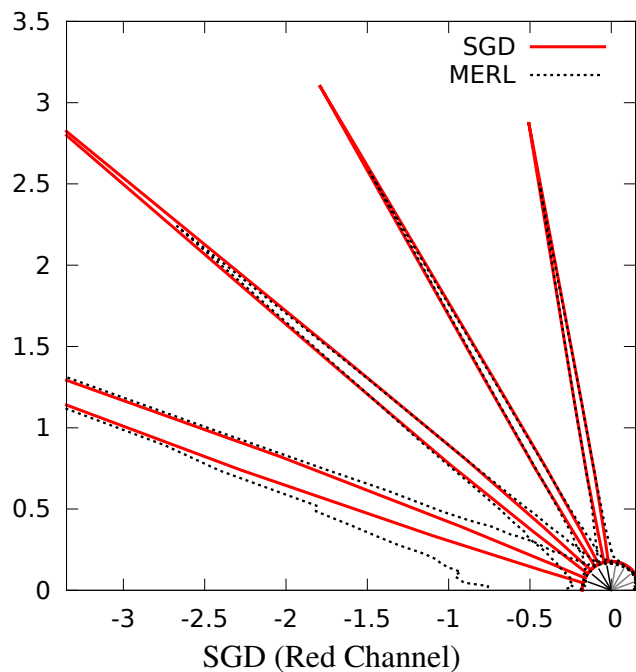
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0176527	0.0517555	0.000185443	0.288191	0.418137	0.330999	4223.98	0.138255
Green	0.0761863	0.15899	5.19959e-05	0.170979	0.0486445	0.0294954	16977.4	0.168884
Blue	0.0432331	0.0754193	7.95188e-05	0.145492	0.170328	0.110218	11351.3	0.116563

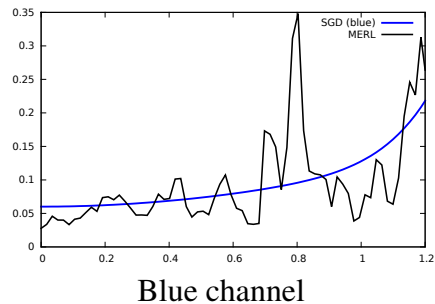
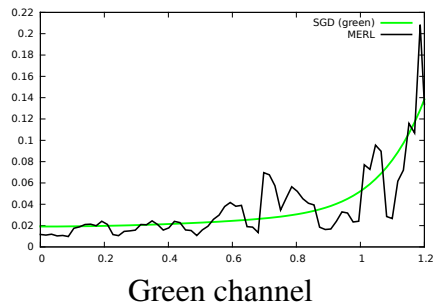
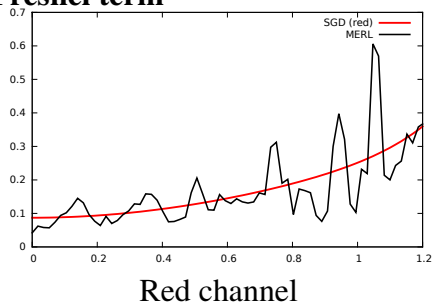
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	5.6545	5.10667e+40	172.888	0.995381
Green	26.1353	1.37049e+85	204.112	1.19417
Blue	1.54193e+07	4.23355e+06	403.267	0.646645

BRDF lobes in the incidence plane (Cubic root applied)

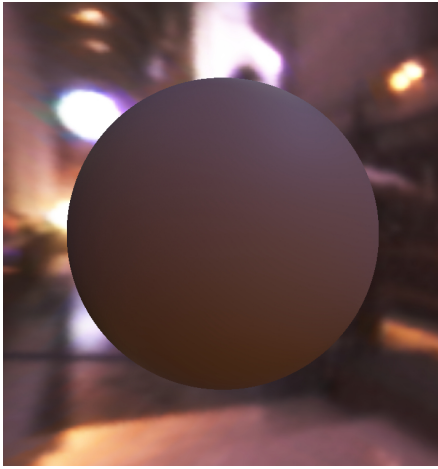


Fresnel term

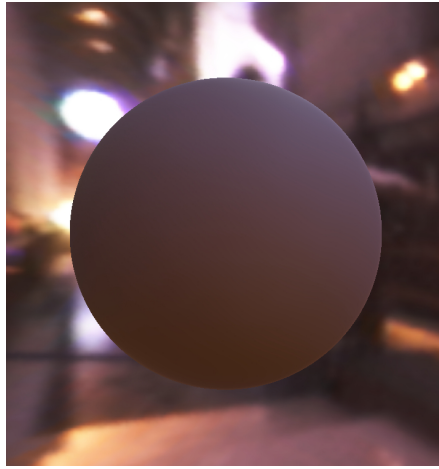


Material Name: *green-fabric*

Rendered Images



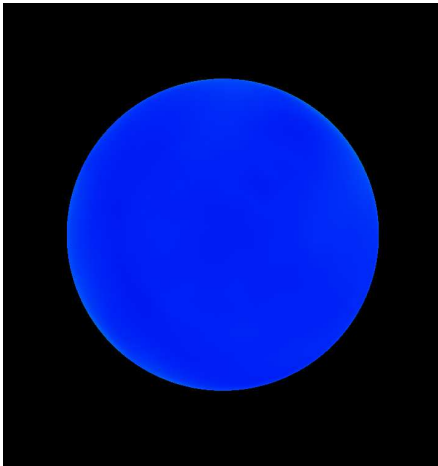
SGD



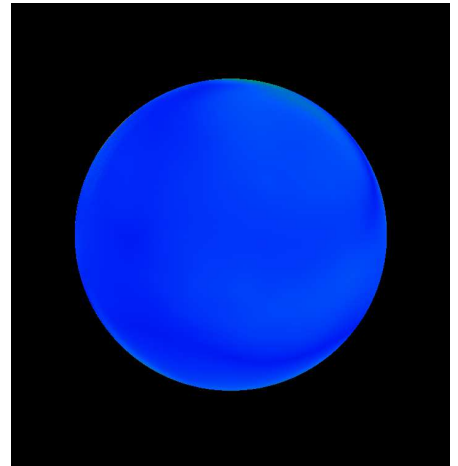
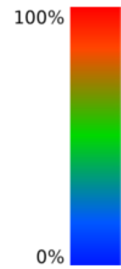
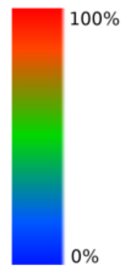
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

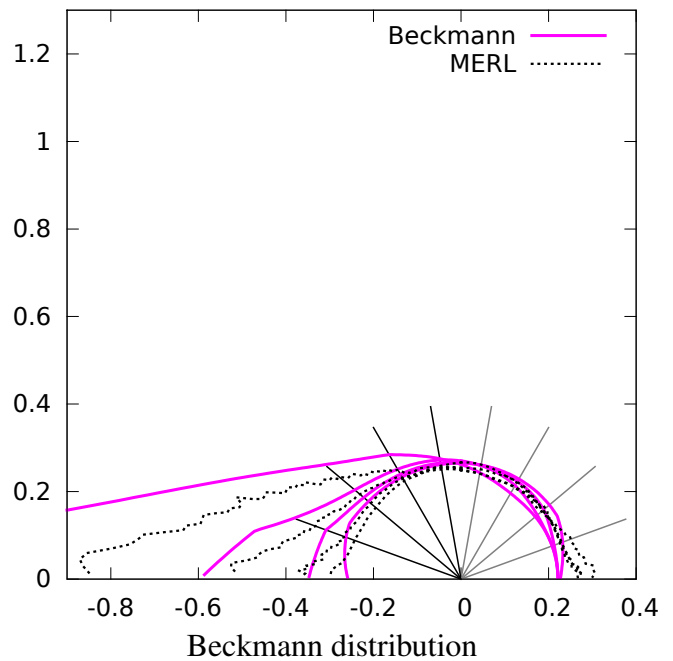
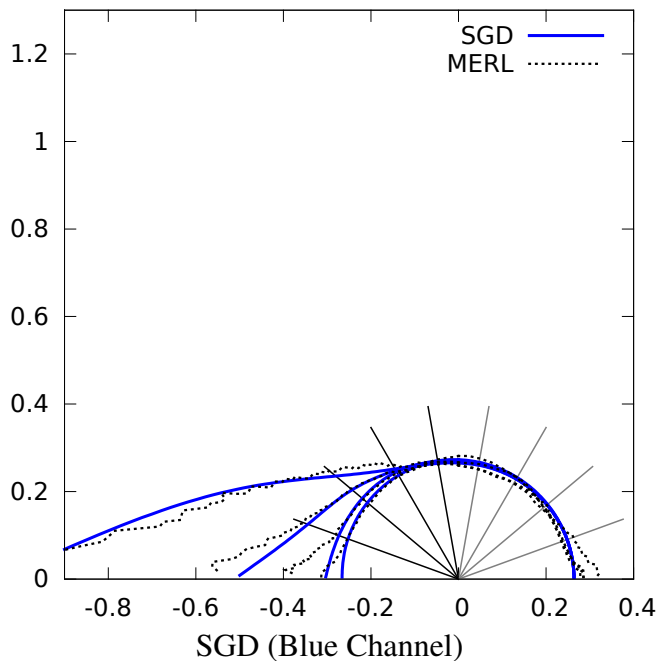
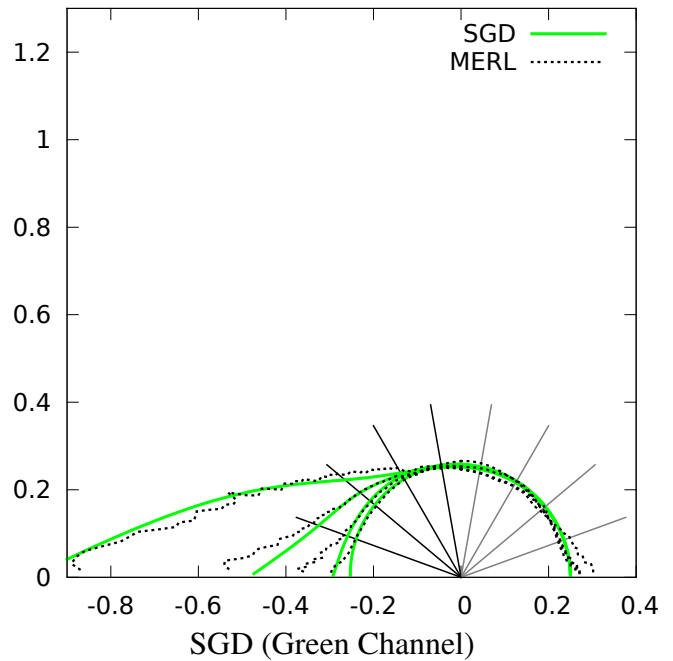
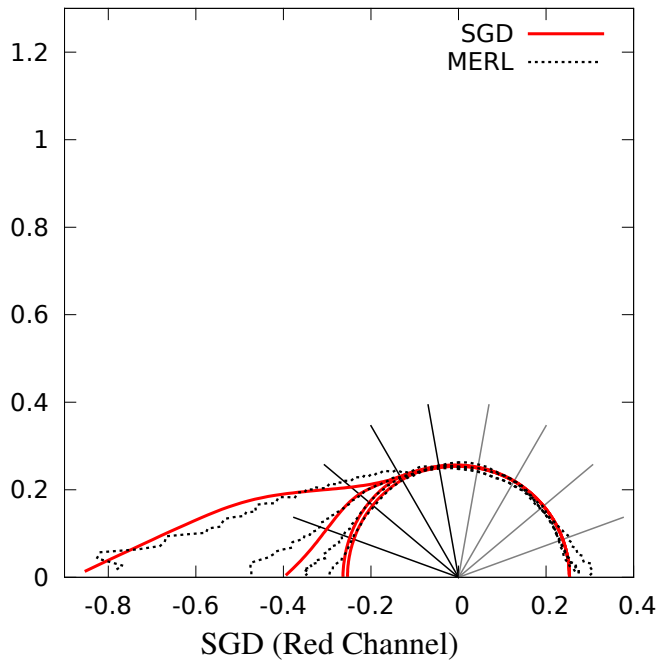
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0511324	0.043898	0.0906425	0.199121	0.117671	0.107501	11.1681	0.000577582
Green	0.0490447	0.108081	0.14646	0.21946	0.0797822	0.0628391	7.43507	0.000635885
Blue	0.0577457	0.118528	0.125546	0.130311	0.0840896	0.0668466	8.69777	0.000729507

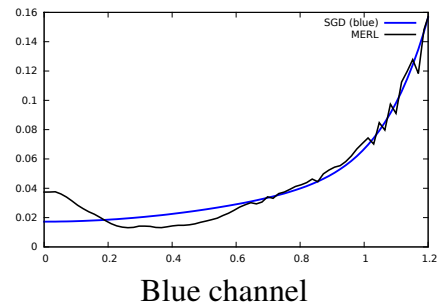
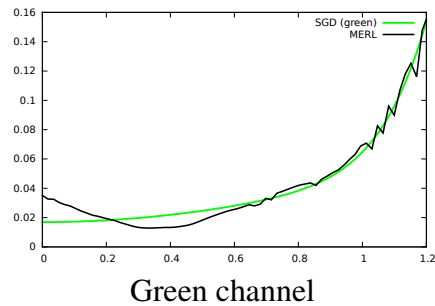
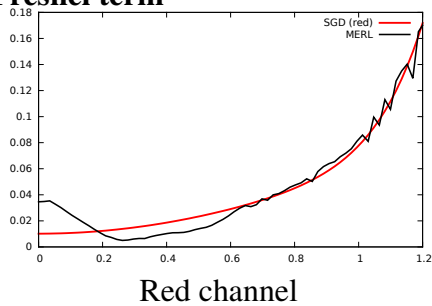
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.65909	0.00055264	16.8276	0.153958
Green	3.72793	0.00331292	12.7802	0.17378
Blue	3.72472	0.0119365	12.1538	0.291679

BRDF lobes in the incidence plane (Cubic root applied)

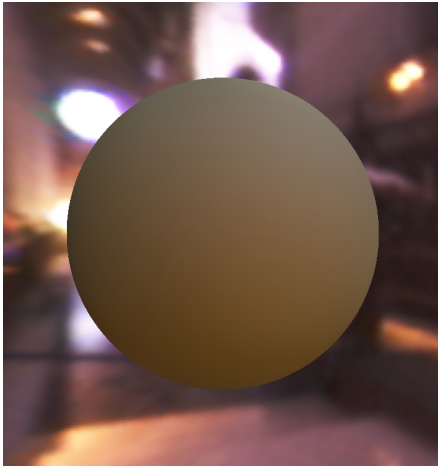


Fresnel term

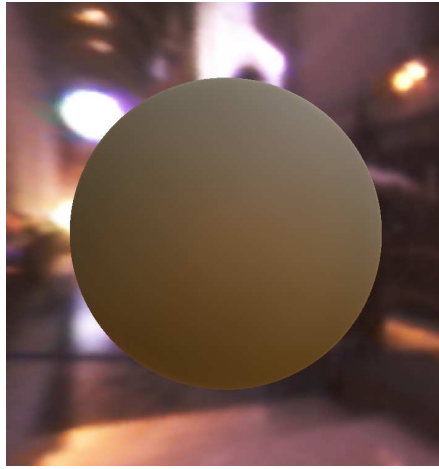


Material Name: *green-latex*

Rendered Images



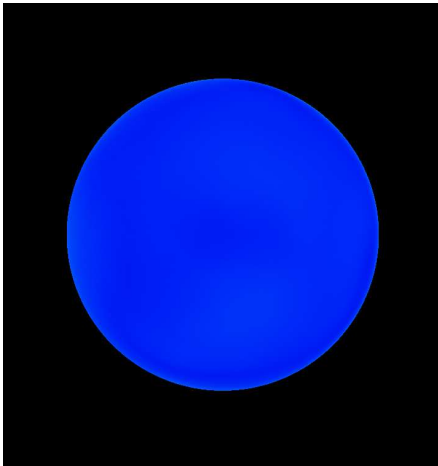
SGD



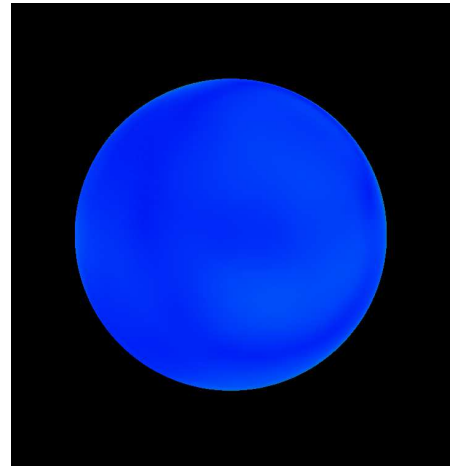
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

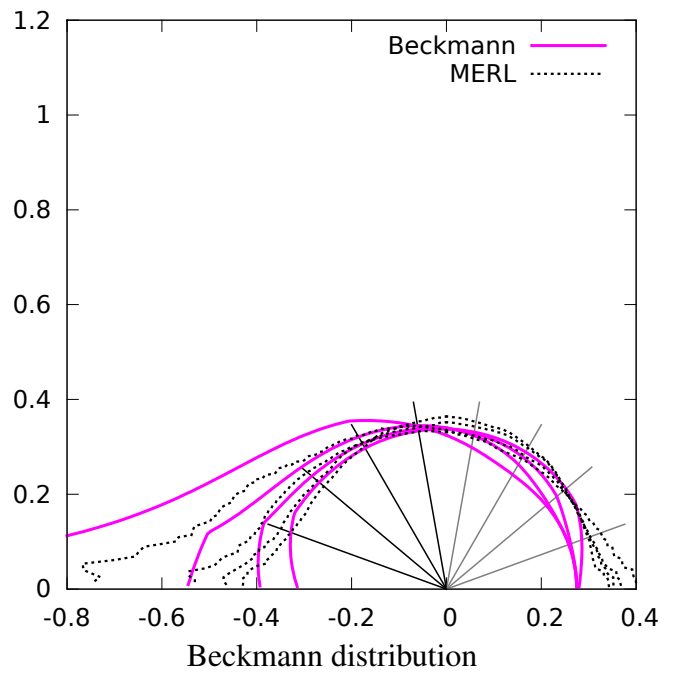
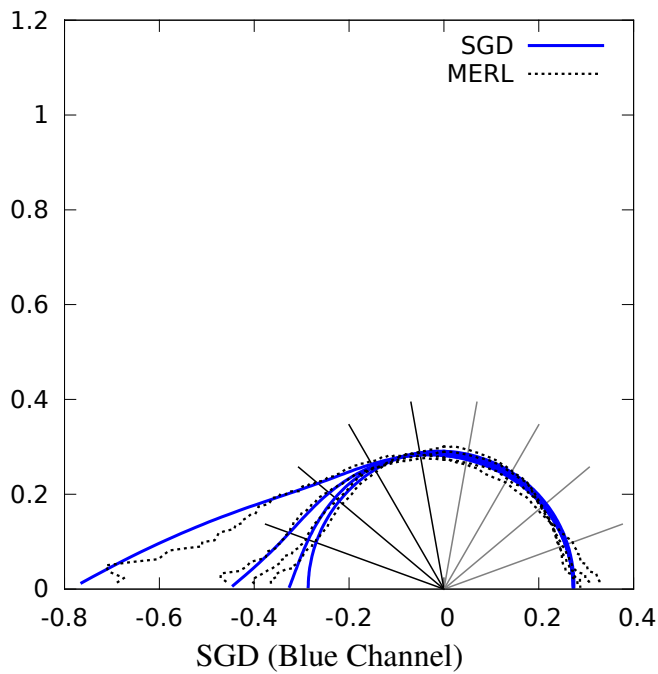
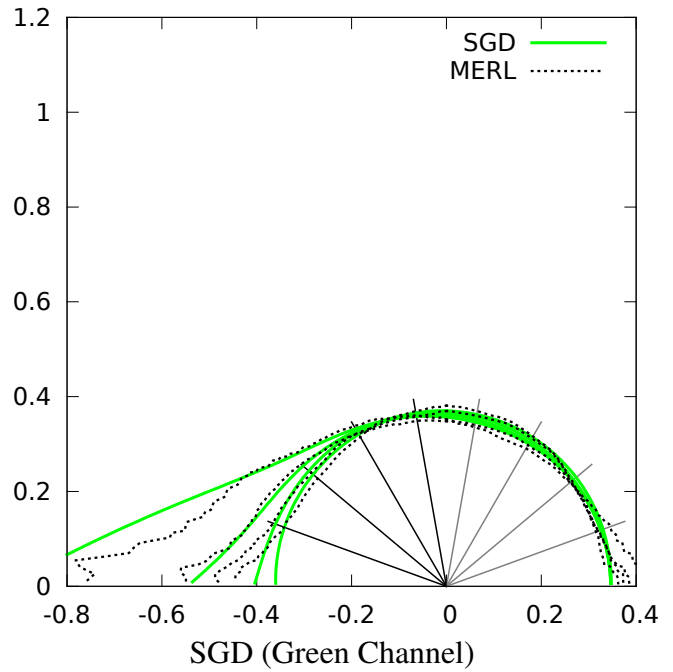
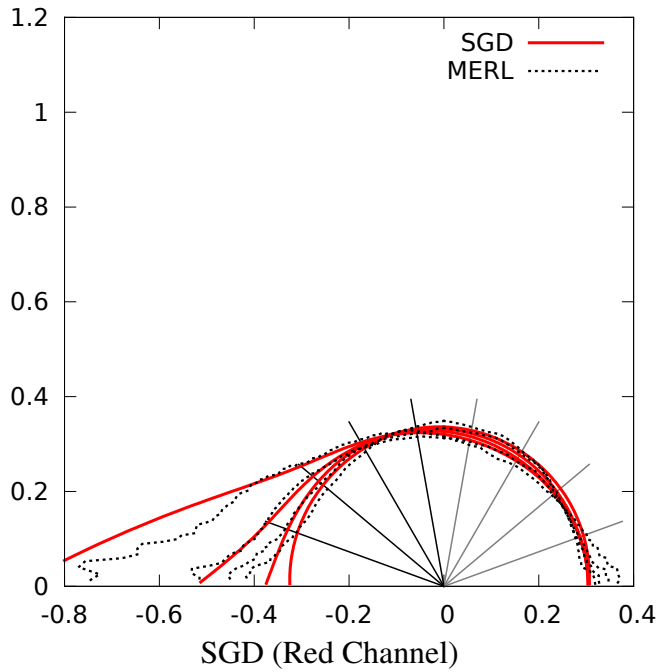
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0885476	0.177041	0.241826	0.175925	0.0213854	-0.0864353	5.17117	0.000875063
Green	0.13061	0.16009	0.21913	0.162514	0.0498004	-0.0518848	5.55867	0.00103454
Blue	0.0637004	0.101365	0.2567	0.326958	0.0677643	-0.00668045	4.84094	0.000568252

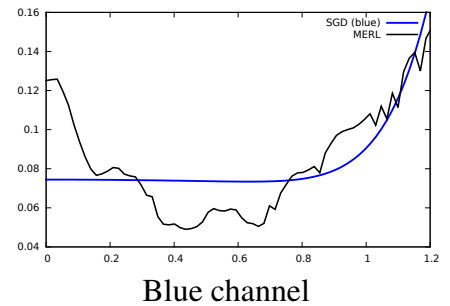
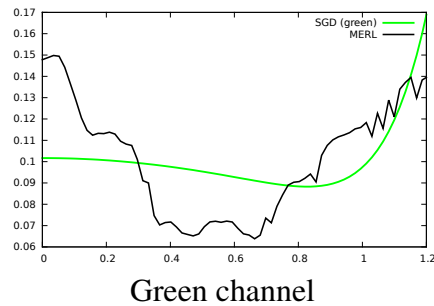
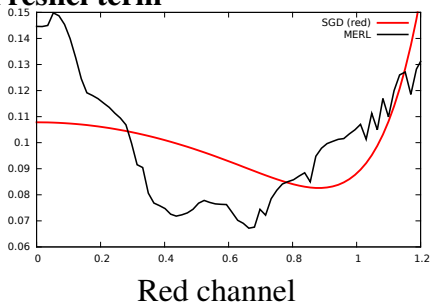
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.61304	0.0417628	8.4496	0.296393
Green	2.75985	0.0352726	8.91691	0.295144
Blue	2.84236	0.0128547	9.57998	0.18077

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

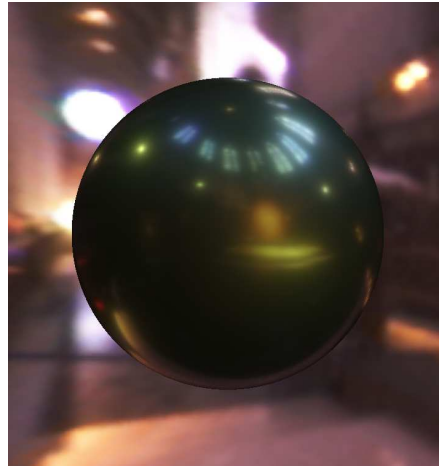


Material Name: *green-metallic-paint2*

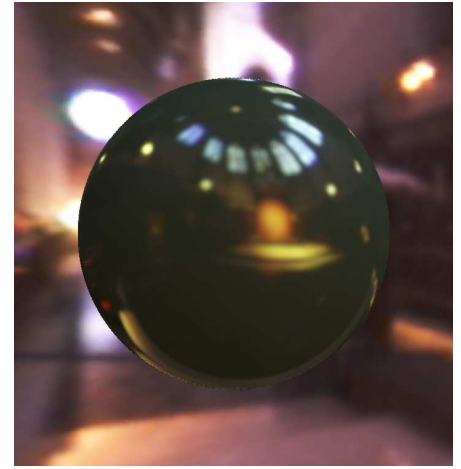
Rendered Images



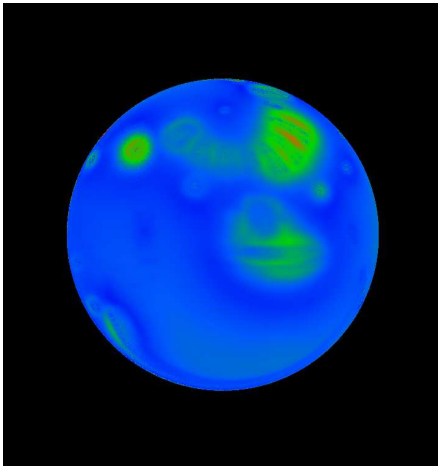
SGD



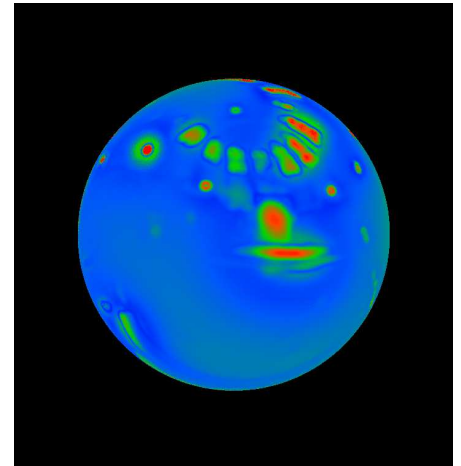
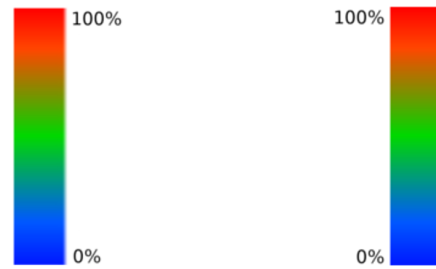
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

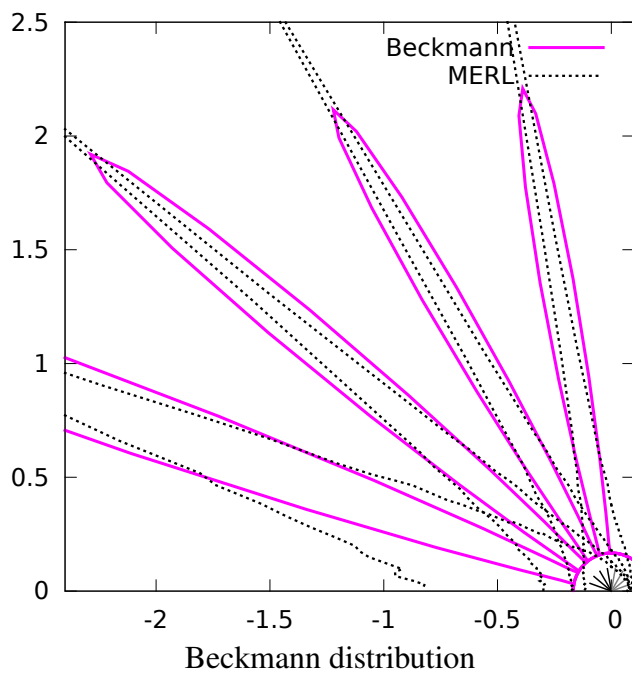
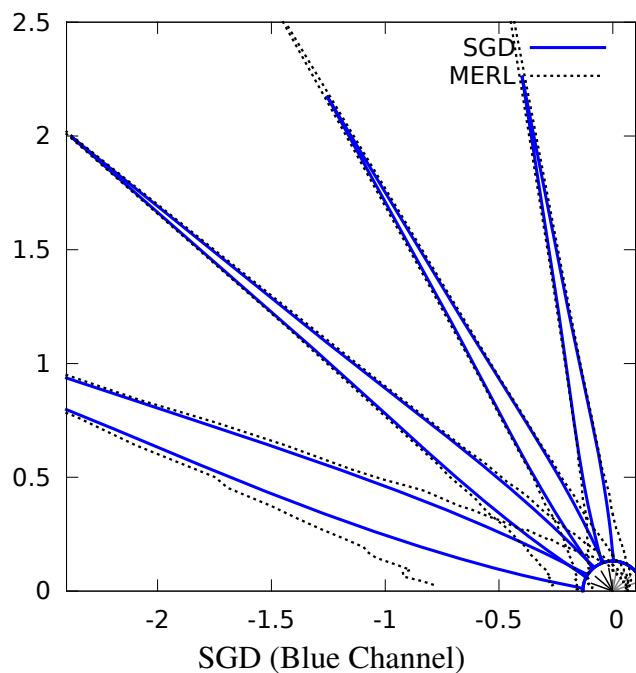
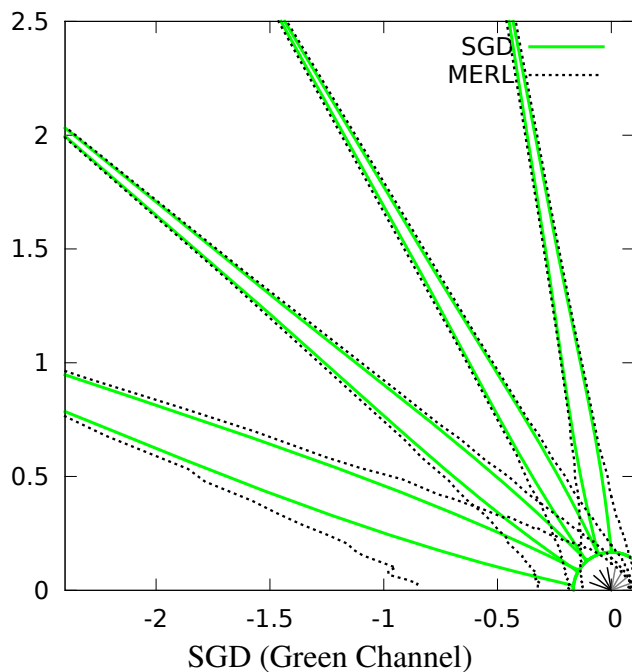
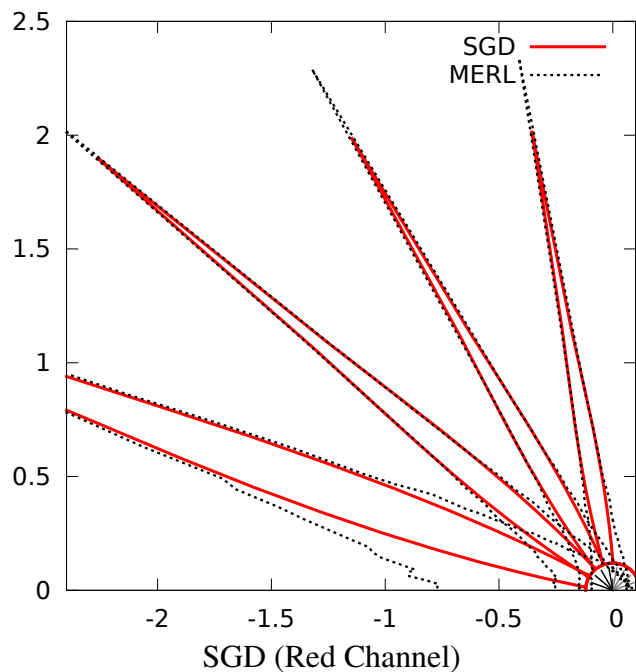
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00536389	0.0553207	0.00131834	0.436009	0.291808	0.126008	493.87	0.019819
Green	0.0147585	0.0656441	0.00140737	0.57969	0.194127	-0.0681937	362.85	0.0506927
Blue	0.0072232	0.0608999	0.00171711	0.54703	0.199549	0.0148264	317.92	0.0279691

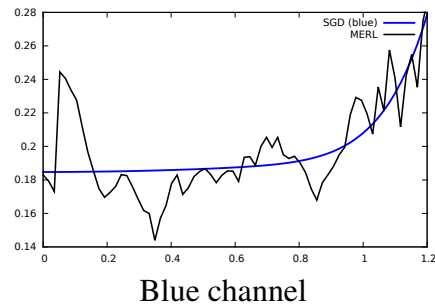
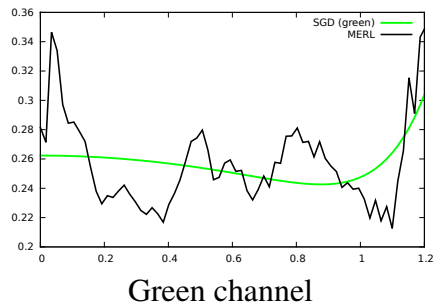
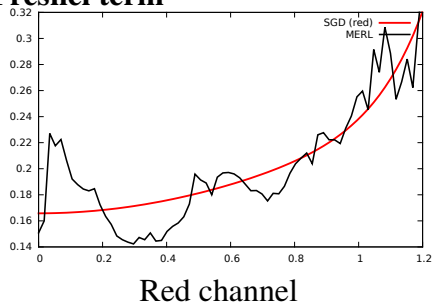
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.96631e-08	15.5833	8.31751	0.561587
Green	3.41674e-06	3.60732e-07	25.0069	-0.431953
Blue	8.72658e-07	3.78431e-07	21.7501	-0.657077

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *green-metallic-paint*

Rendered Images



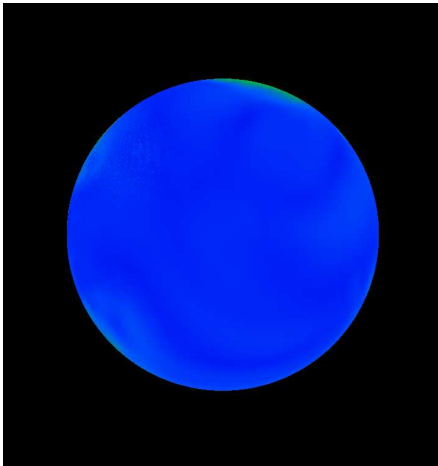
SGD



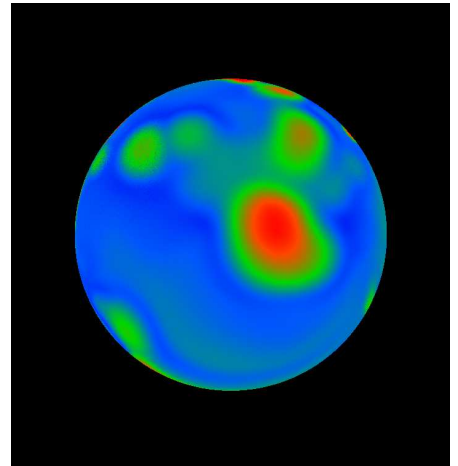
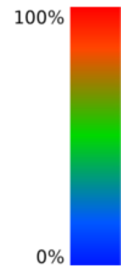
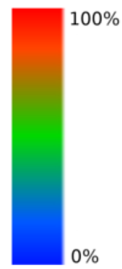
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

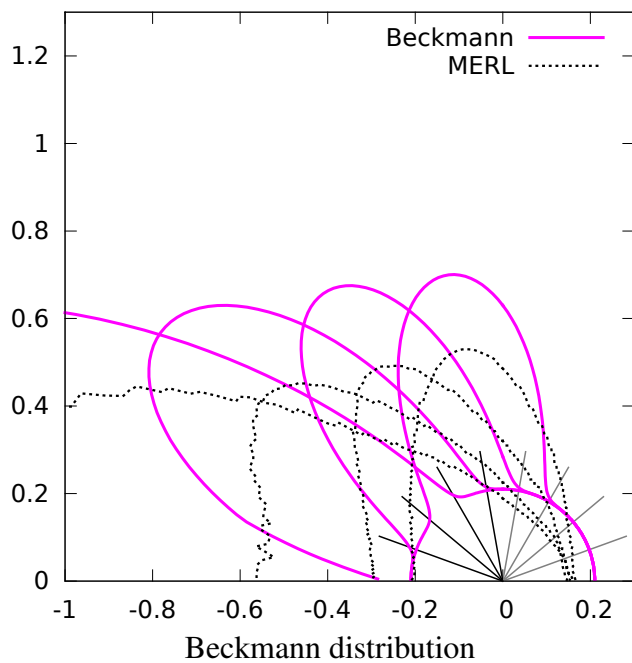
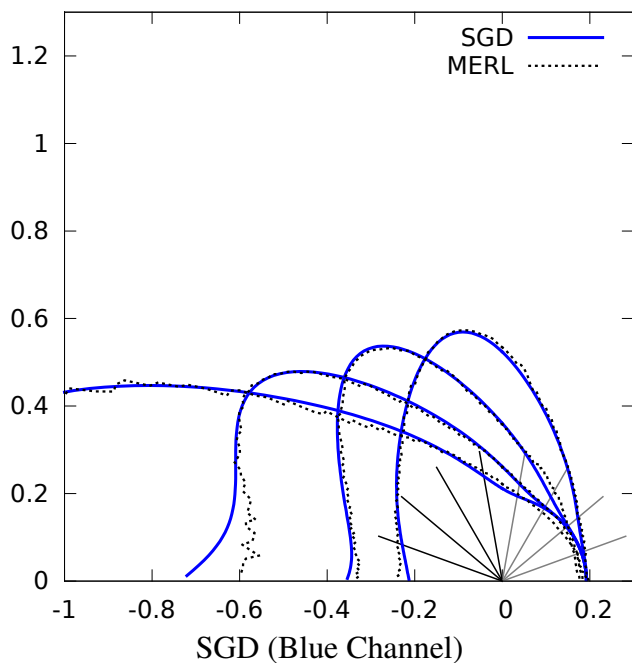
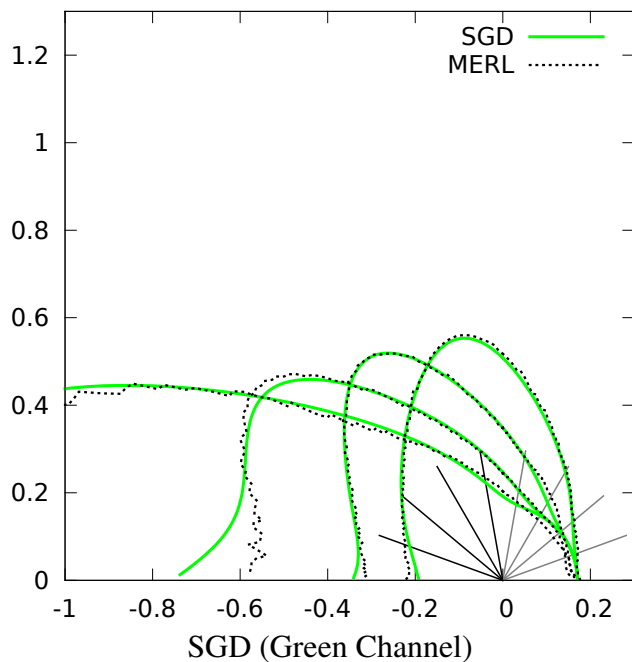
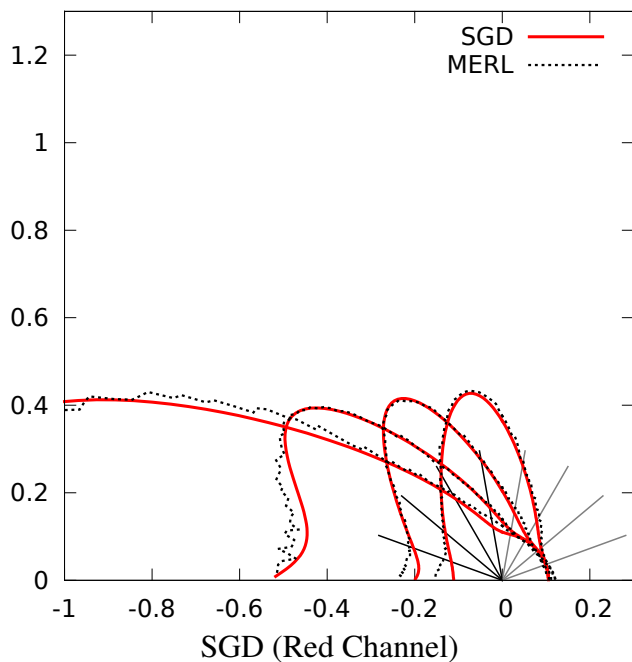
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00368935	0.185621	0.131402	1.28366	0.12483	0.028874	3.62502	0.00120994
Green	0.0155555	0.436002	0.146271	0.865104	0.0443223	-0.118581	5.13725	0.00217841
Blue	0.022272	0.322925	0.154061	0.944013	0.0955612	-0.139373	4.71161	0.00218444

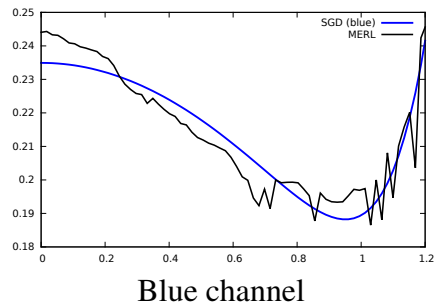
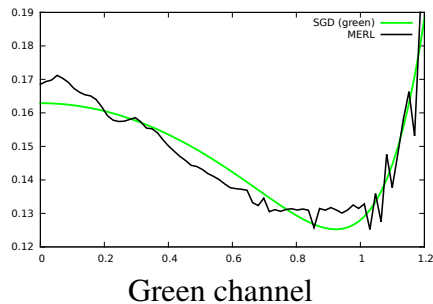
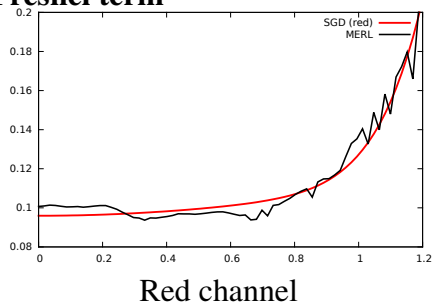
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.97389	5.5607e-08	27.5467	-0.204638
Green	2.72437	1.1239e-07	23.1688	-0.326555
Blue	2.63239	9.76666e-08	23.2911	-0.334024

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *green-plastic*

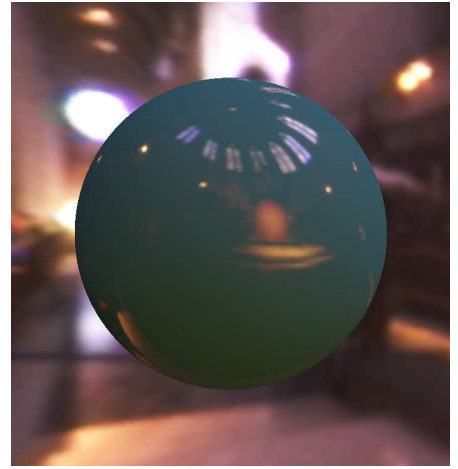
Rendered Images



SGD



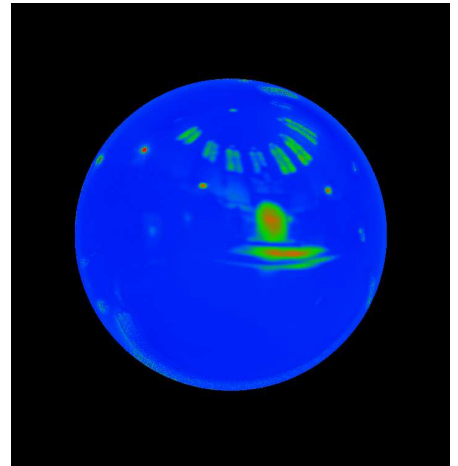
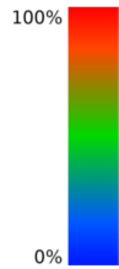
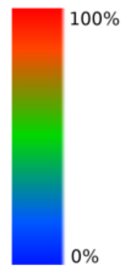
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

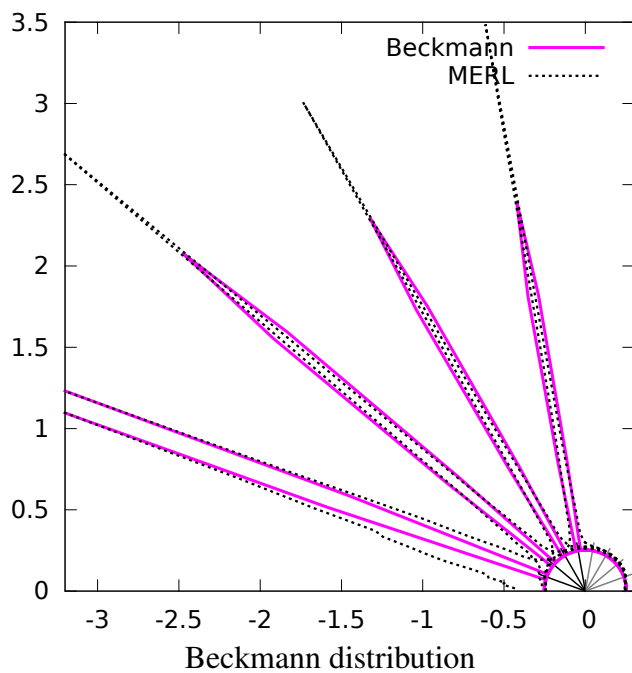
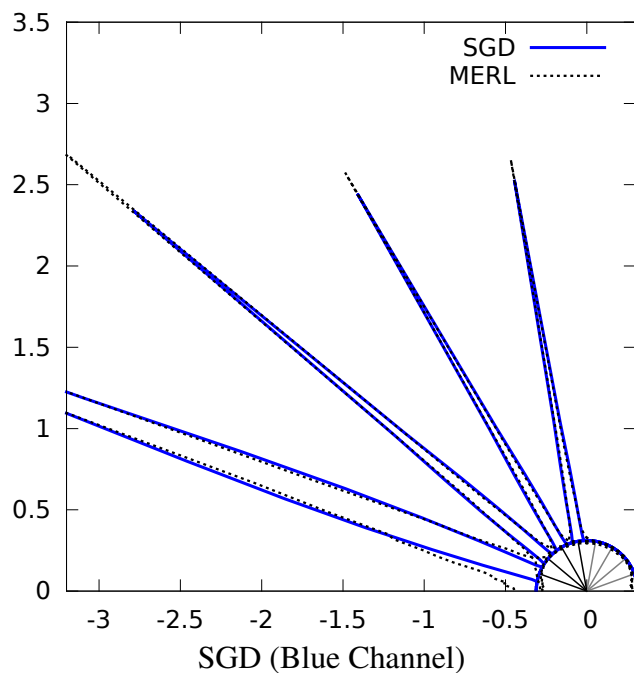
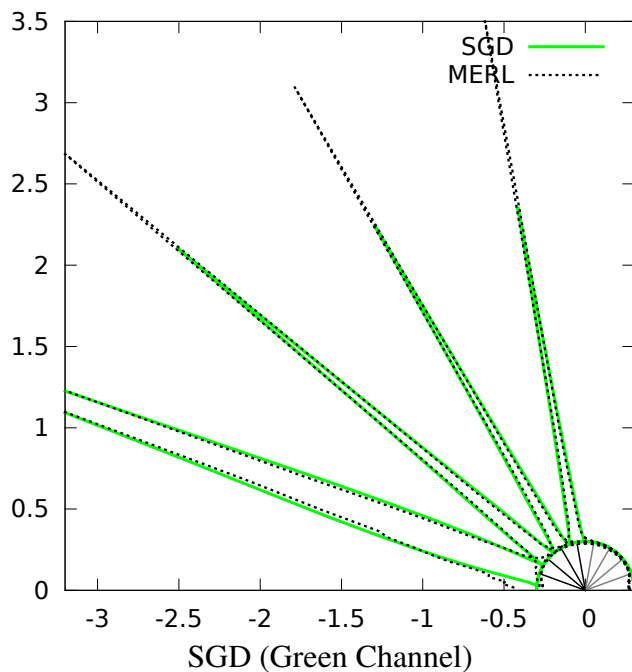
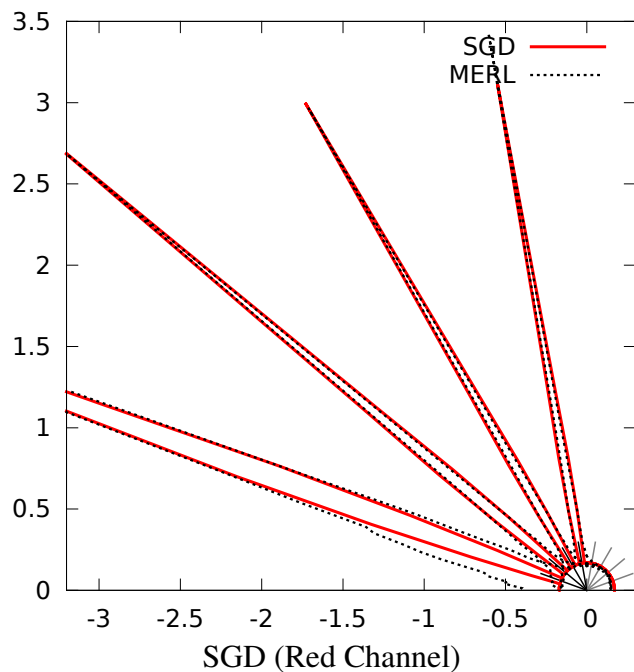
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.015387	0.0607427	0.000302146	0.373134	0.116395	0.0123694	2329.55	0.0411204
Green	0.0851675	0.156977	0.00197038	0.751741	0.0388464	-0.0038785	181.586	0.0490786
Blue	0.0947402	0.125155	0.000690284	0.505735	0.0476683	0.00864048	833.886	0.0385724

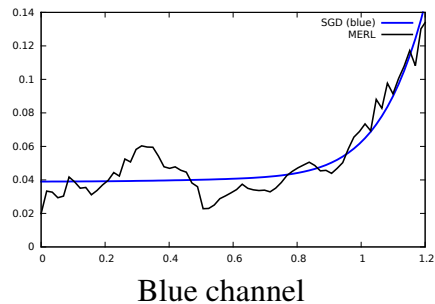
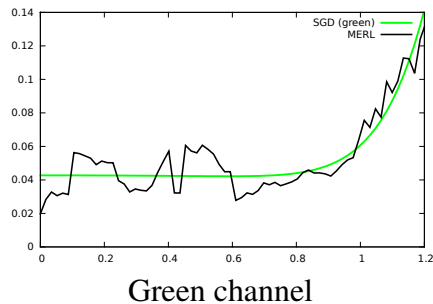
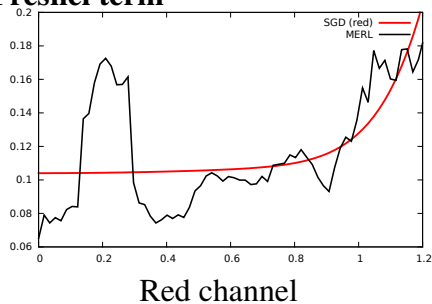
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.39581	6.38801e-08	260.135	0.510576
Green	0.000128411	2.49751e-07	31.8416	-0.156086
Blue	3.06753e-07	5.82332e-07	26.4101	-0.337325

BRDF lobes in the incidence plane (Cubic root applied)

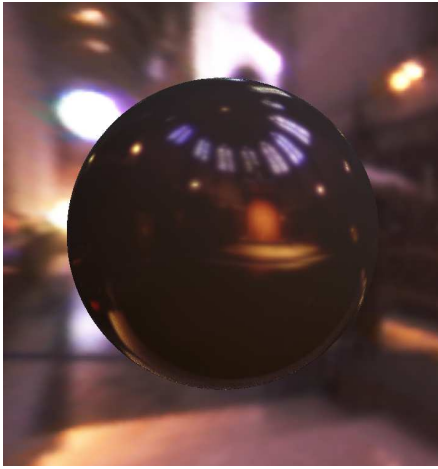


Fresnel term



Material Name: *hematite*

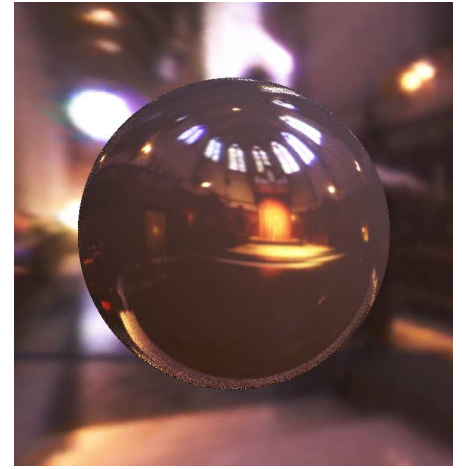
Rendered Images



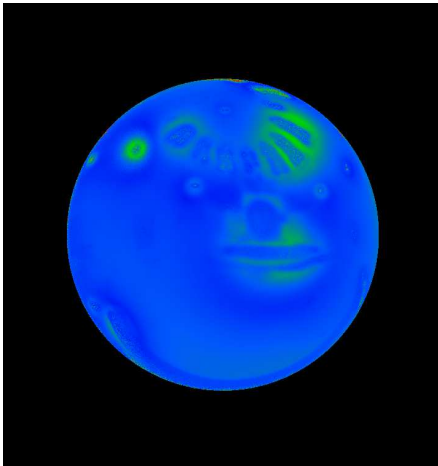
SGD



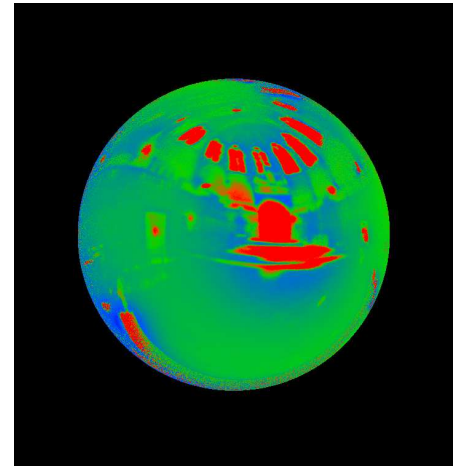
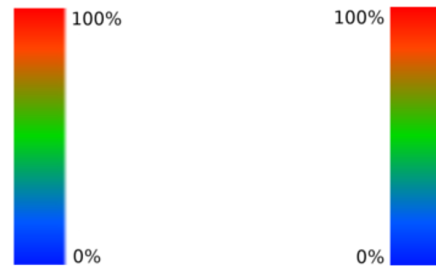
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

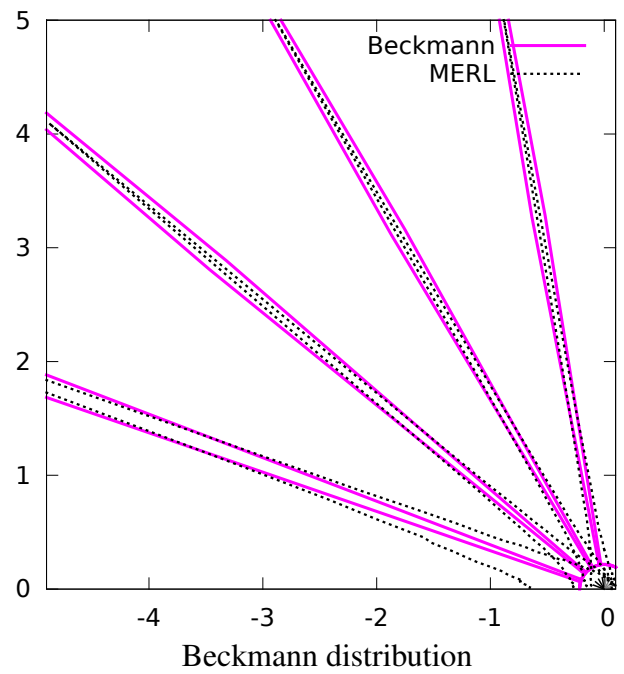
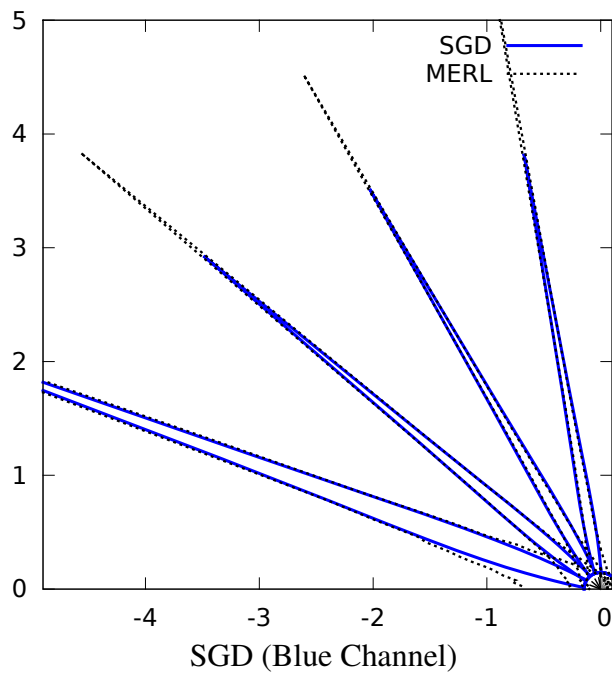
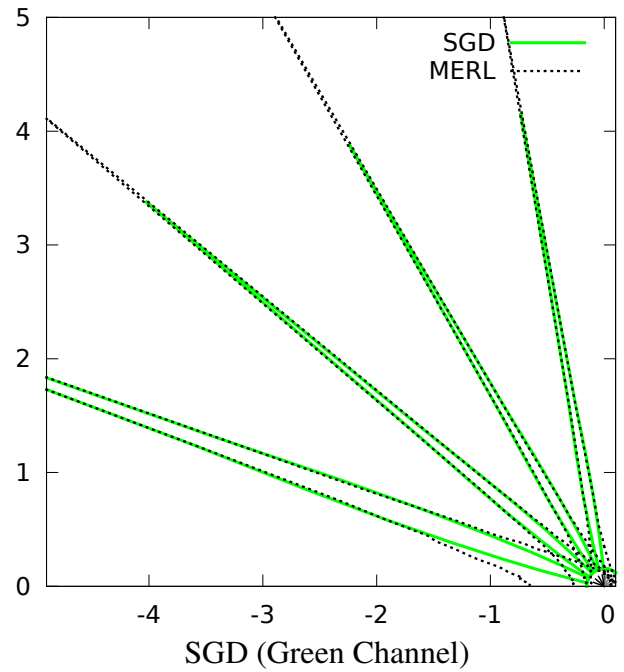
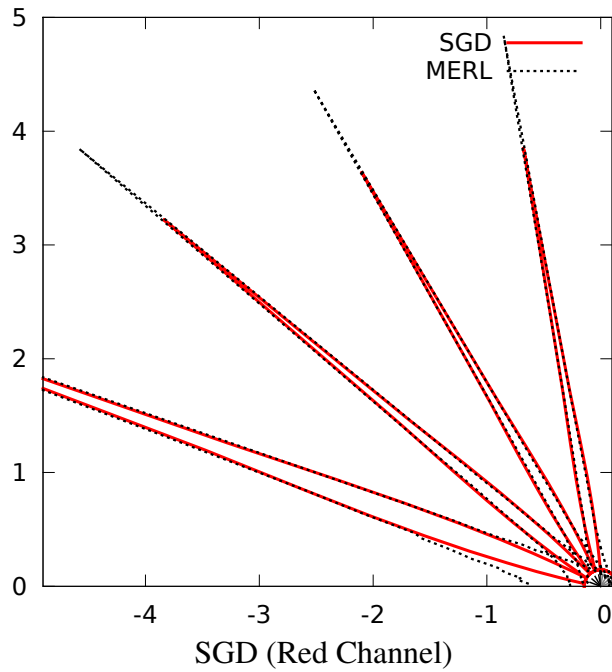
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00948374	0.0705694	0.000908552	0.515183	0.235045	-0.120178	626.075	0.0598105
Green	0.0117628	0.118965	0.000601576	0.498157	0.0609324	-0.096611	967.655	0.0605776
Blue	0.00985037	0.115059	0.00184248	0.73351	0.00720315	-0.235146	201.871	0.0805566

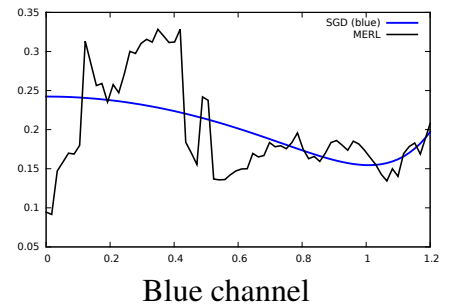
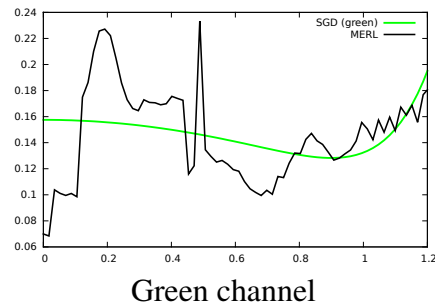
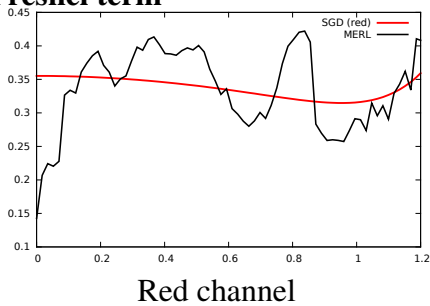
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.94735e-07	5.04376e-07	24.7601	-0.431506
Green	3.54792e-07	16.4874	14.7537	0.577853
Blue	0.000101676	2.78427e-07	31.4869	-0.162174

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *ipswich-pine-221*

Rendered Images



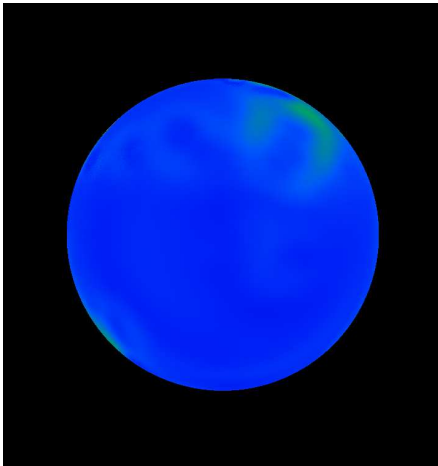
SGD



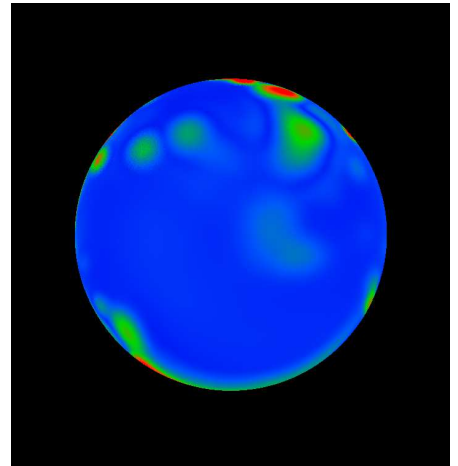
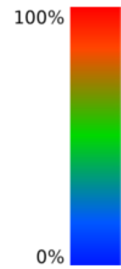
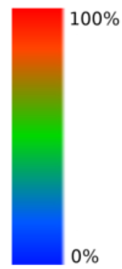
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

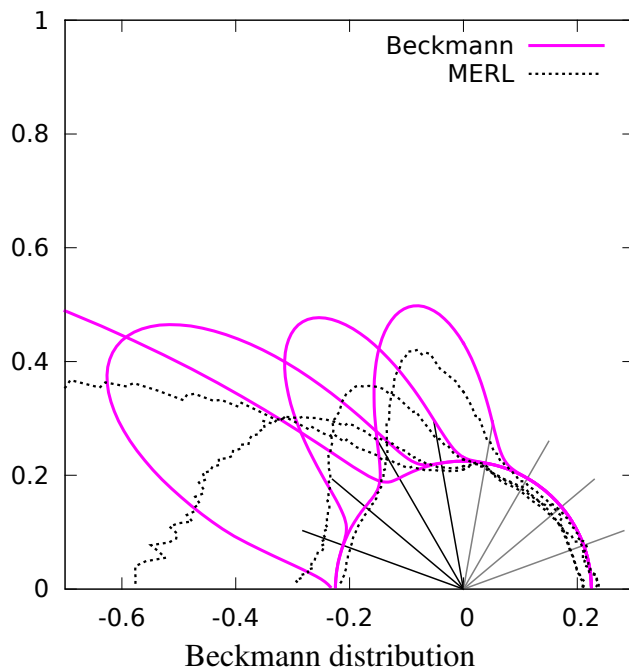
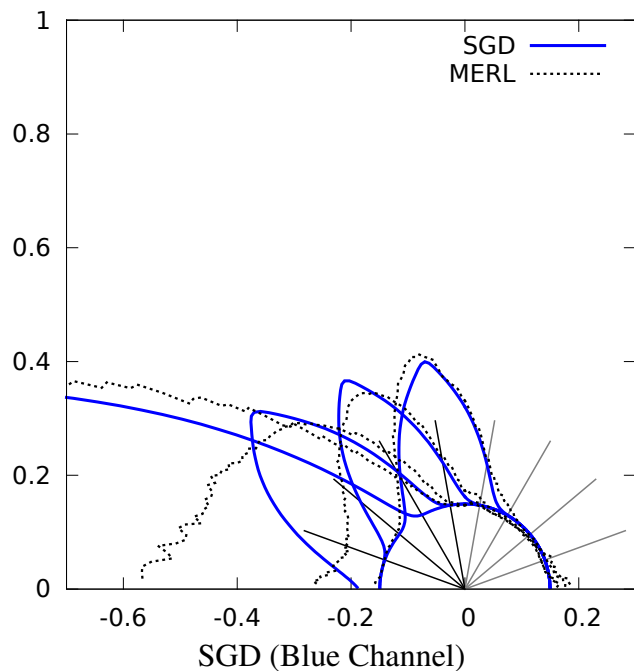
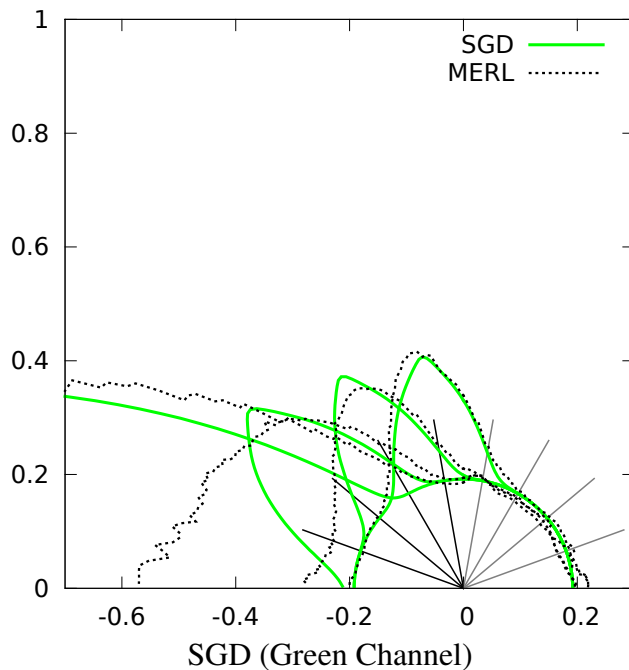
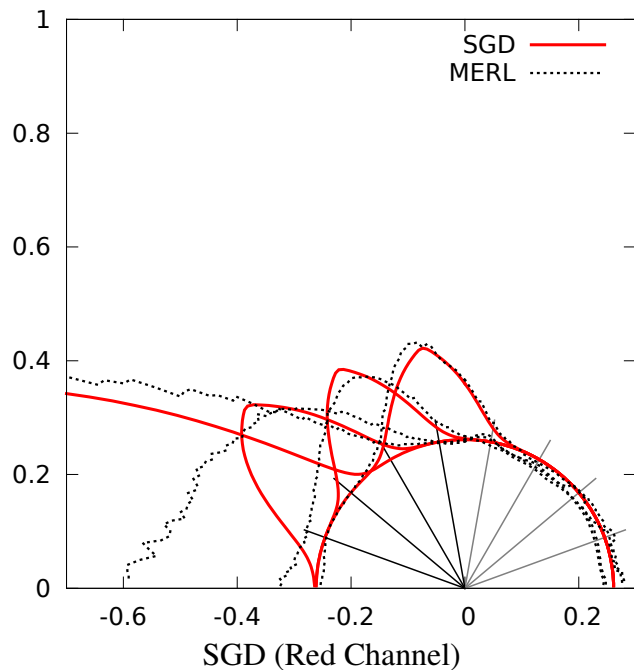
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0560746	0.0991995	0.014258	0.0625943	1.55288e-13	-0.0675784	68.7248	0.00364018
Green	0.0222518	0.106719	0.0178759	0.113994	6.595e-12	-0.0696373	53.3521	0.00320748
Blue	0.0105117	0.110343	0.0188163	0.118296	3.97788e-13	-0.0703103	50.6148	0.00300736

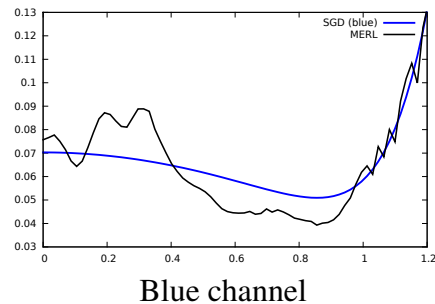
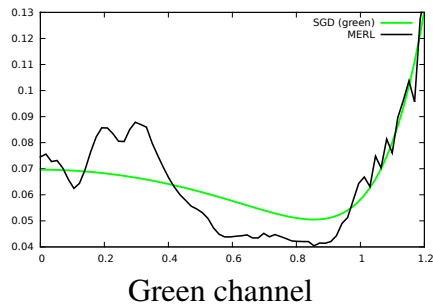
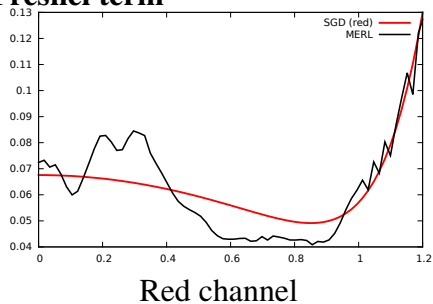
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.36482	111.962	20.956	0.842456
Green	6.37738	1.68378	23.9475	0.66795
Blue	6.35839	0.850892	24.0837	0.641354

BRDF lobes in the incidence plane (Cubic root applied)

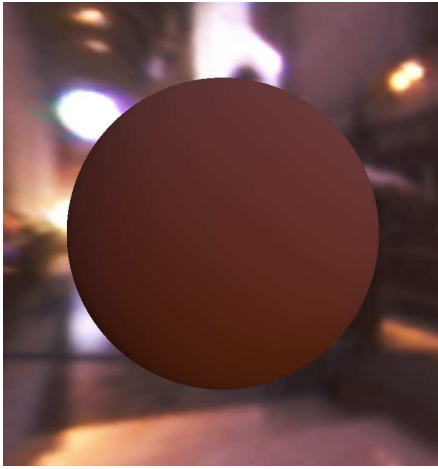


Fresnel term



Material Name: *light-brown-fabric*

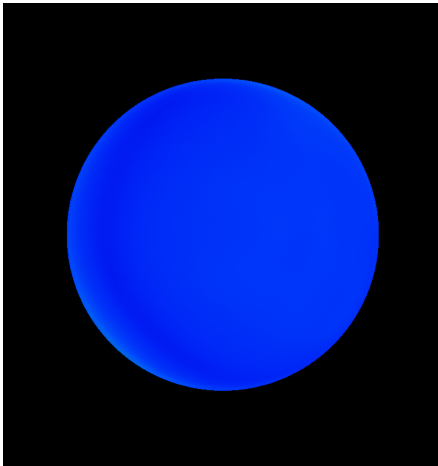
Rendered Images



SGD



Reference



SGD (Lab difference)



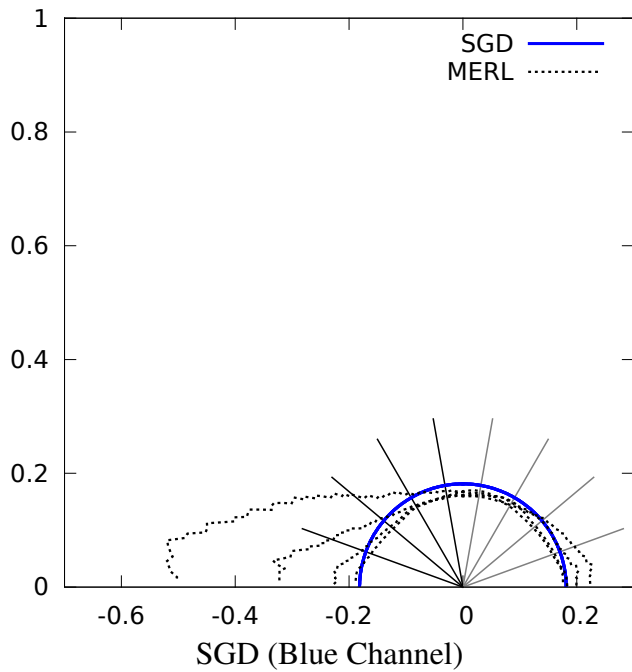
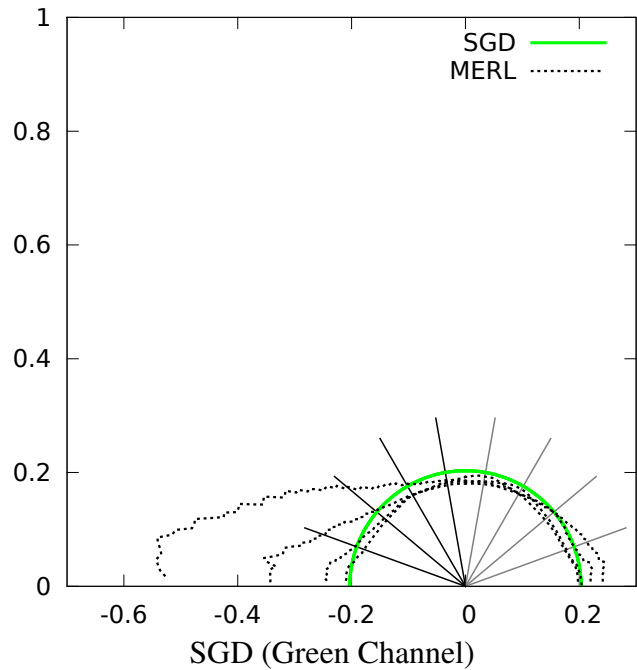
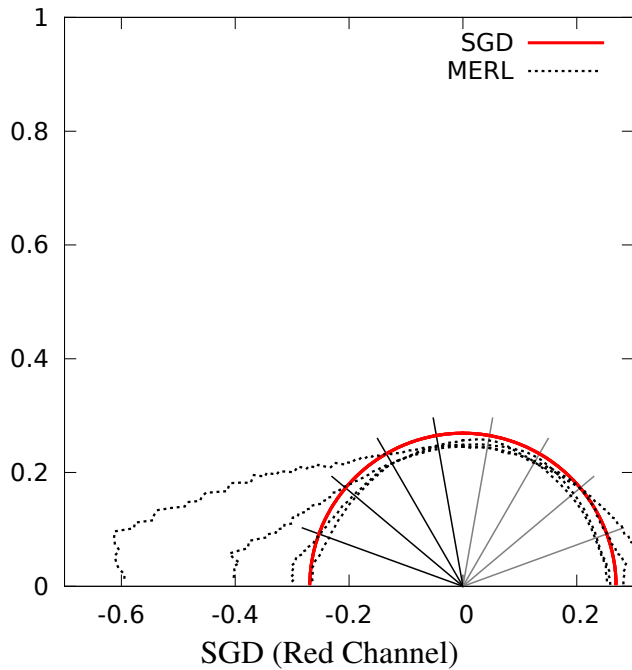
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0612259	3.65487e-12	0.147778	0.188292	1	0	7.46192	0.00126964
Green	0.0263619	9.7449e-12	0.137639	0.188374	1	0	7.90085	0.000811029
Blue	0.0187761	4.13685e-12	0.13071	0.189026	1	0	8.23842	0.000670968

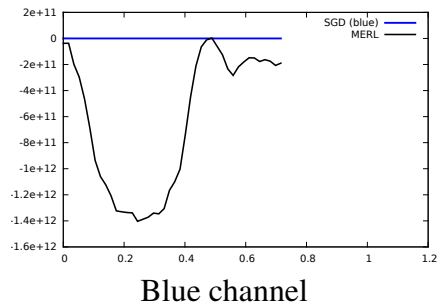
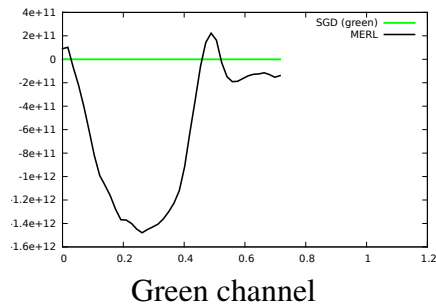
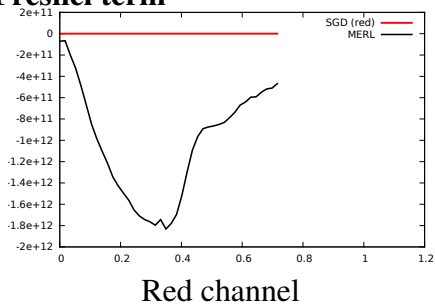
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.59765	0.00660661	12.0657	0.221546
Green	3.74493	0.0049581	12.6487	0.213332
Blue	3.85476	0.00395337	13.0977	0.206743

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

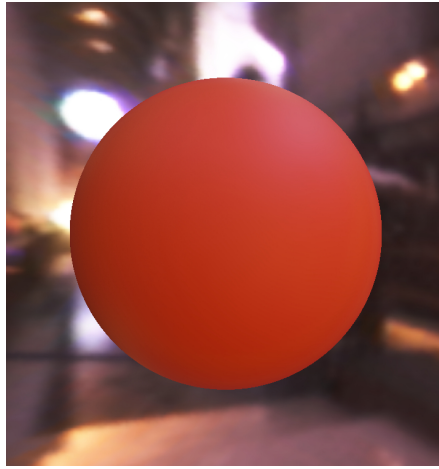


Material Name: *light-red-paint*

Rendered Images



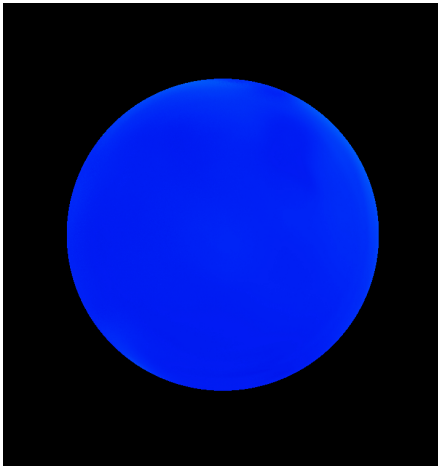
SGD



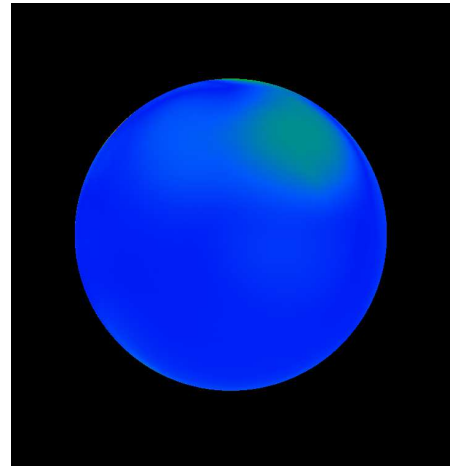
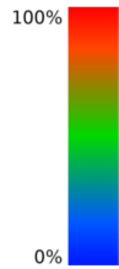
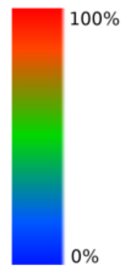
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

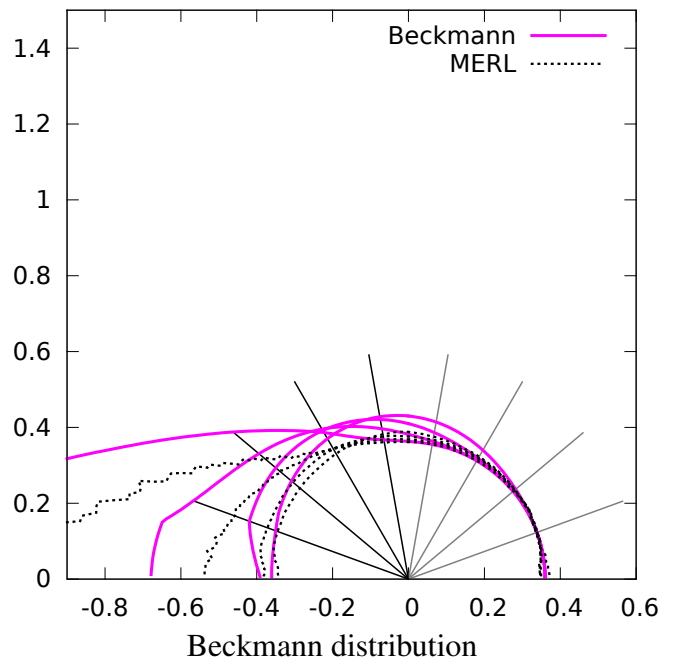
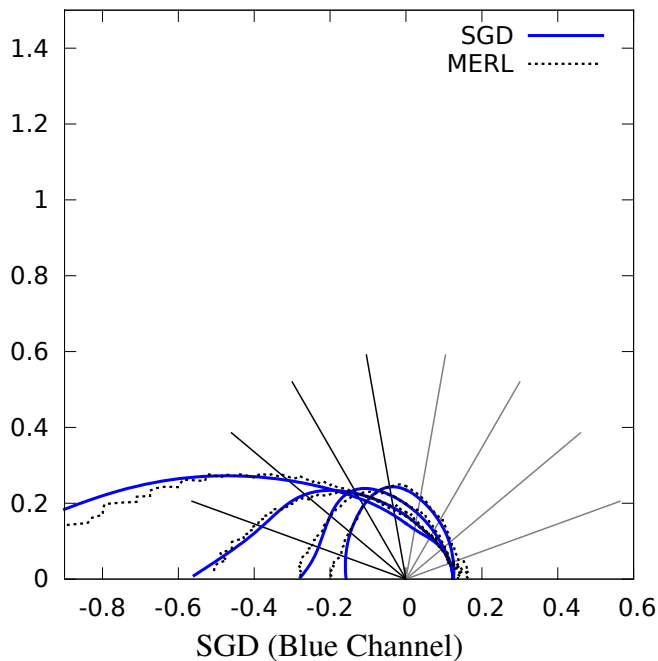
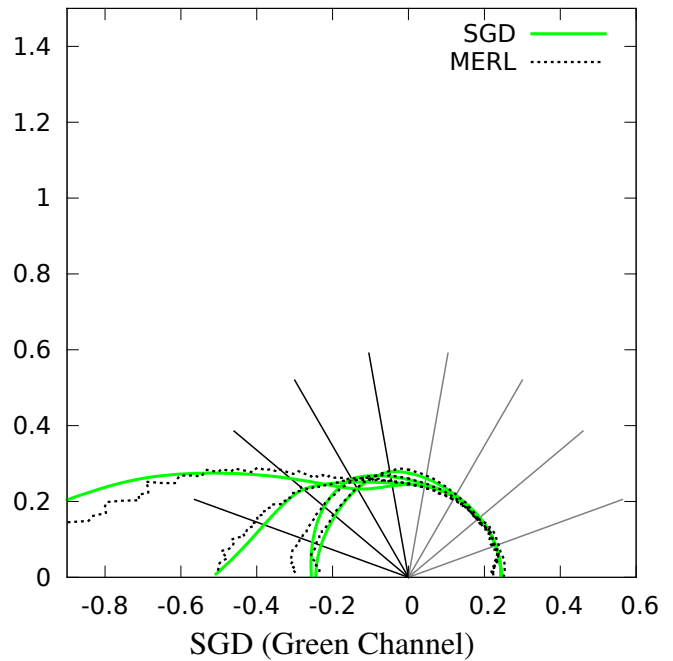
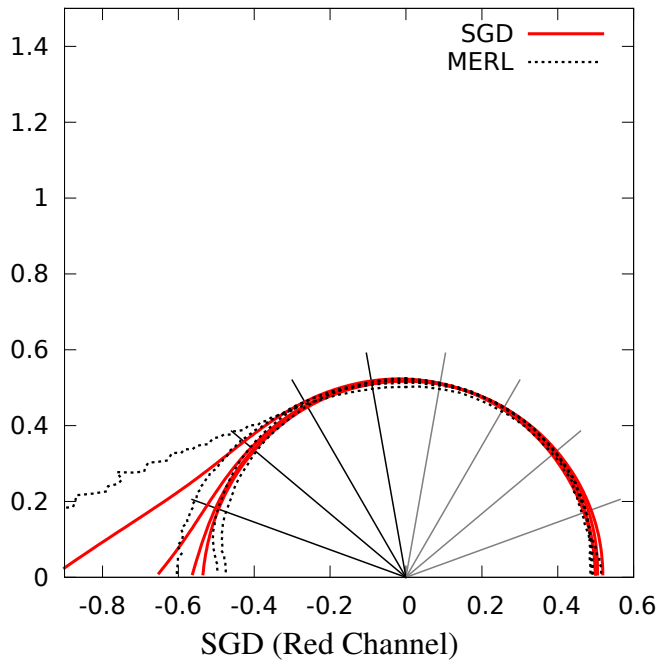
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.391162	0.522785	0.854048	1.40232	0.0346142	-0.0688995	4.68691	0.00271456
Green	0.0458387	0.144057	0.0627781	0.101554	0.0655657	0.0400933	16.2538	0.000889762
Blue	0.0059411	0.214076	0.205965	0.73691	0.0725632	0.0252314	4.71913	0.000505975

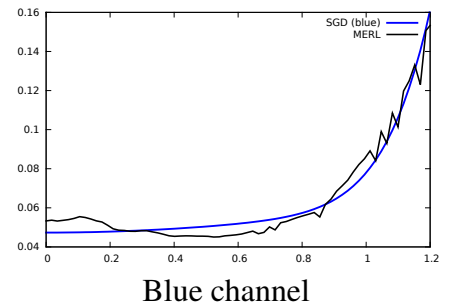
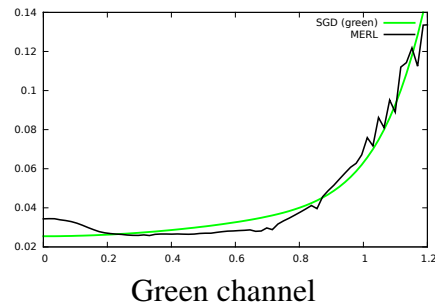
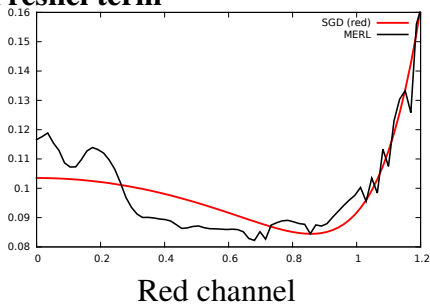
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.72476	0.0969212	5.57044	0.249637
Green	4.88106	0.0124952	16.1561	0.388724
Blue	3.96894	1.02202e-07	19.9884	-0.505514

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *maroon-plastic*

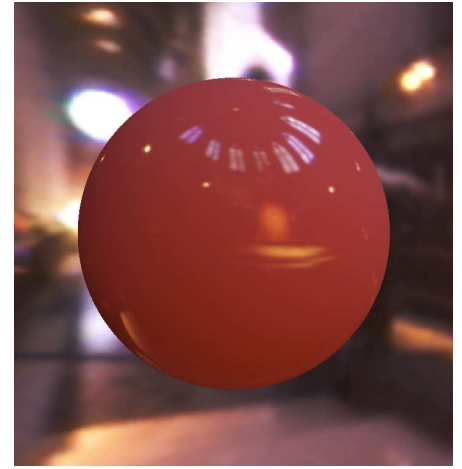
Rendered Images



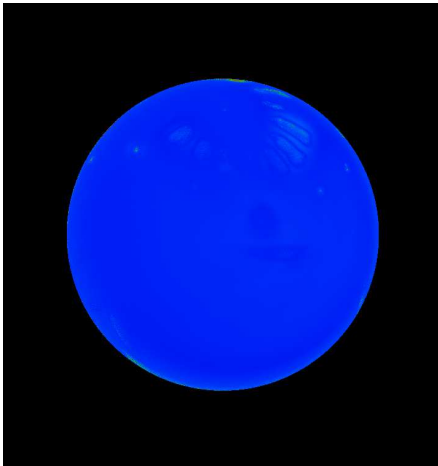
SGD



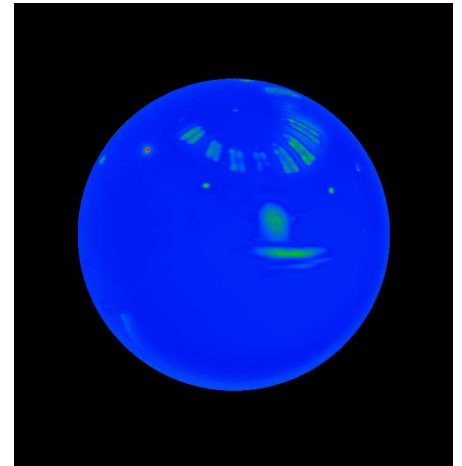
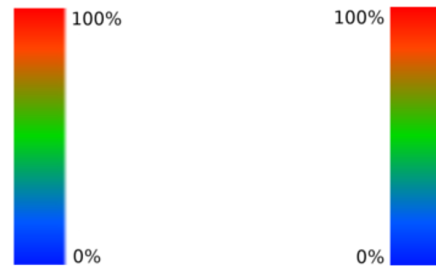
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

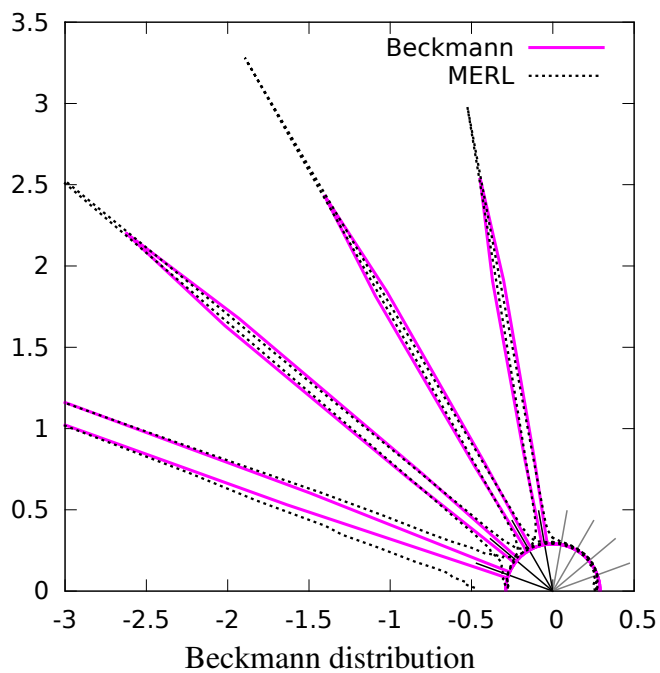
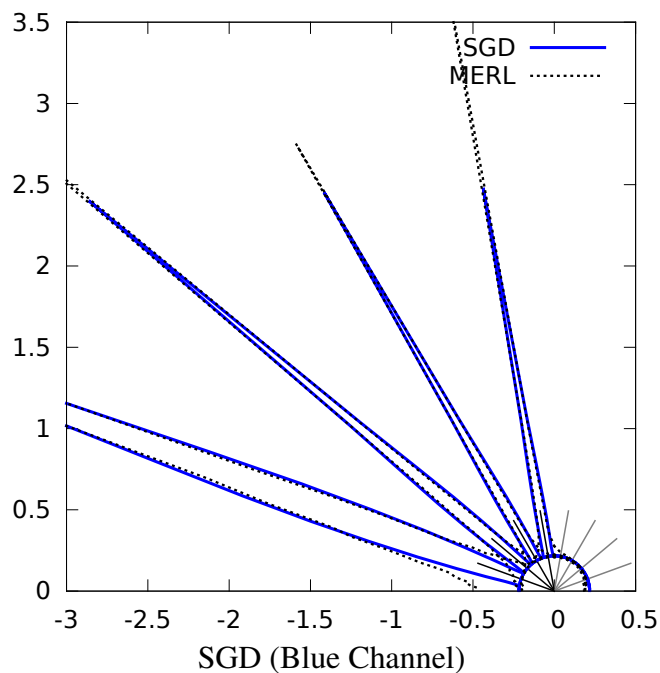
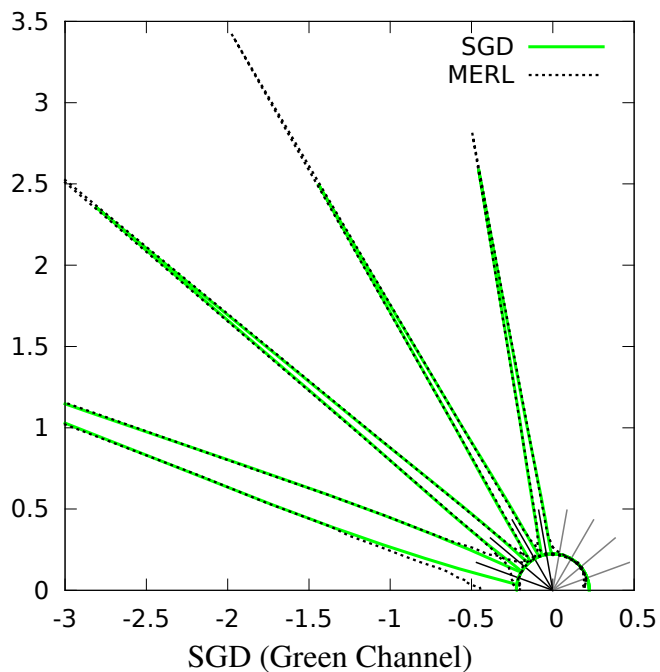
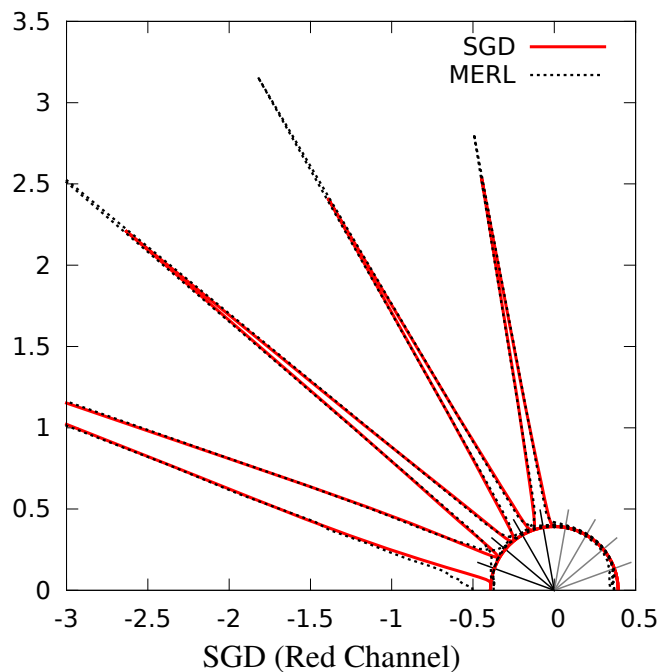
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.189951	0.127693	0.00160715	0.684406	0.0479368	-0.0134224	257.032	0.0285283
Green	0.0353828	0.100703	0.00110827	0.645917	0.0624437	0.00888653	398.91	0.0277773
Blue	0.0321504	0.115731	0.00100127	0.569111	0.0921161	0.0423901	515.363	0.0286259

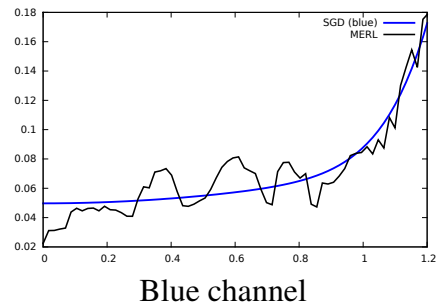
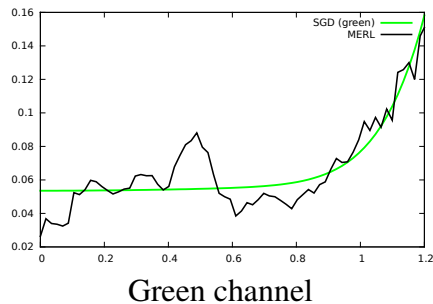
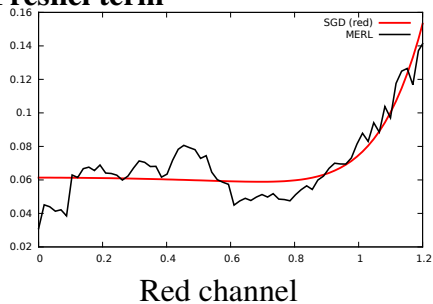
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.57088e-05	3.05979e-07	29.9497	-0.211122
Green	2.62643e-05	2.76112e-07	31.8569	-0.159036
Blue	3.15876e-06	3.67984e-07	27.4899	-0.309239

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *natural-209*

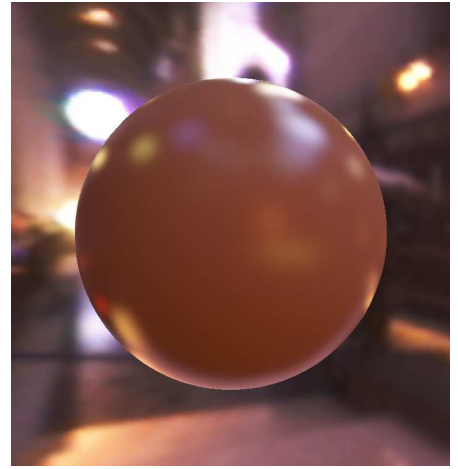
Rendered Images



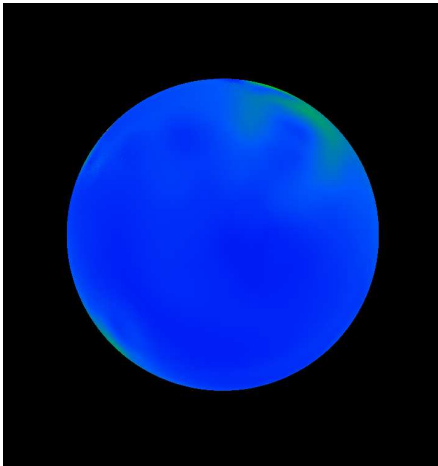
SGD



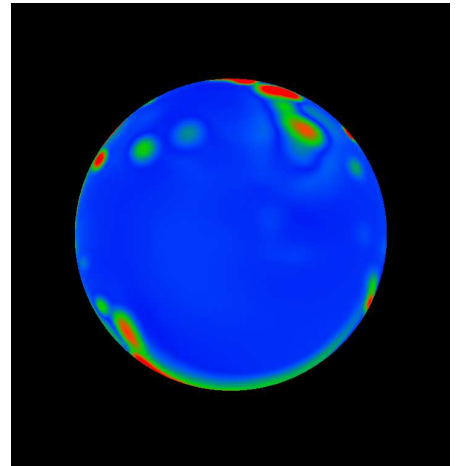
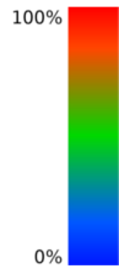
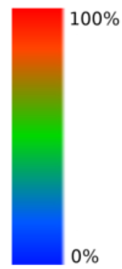
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

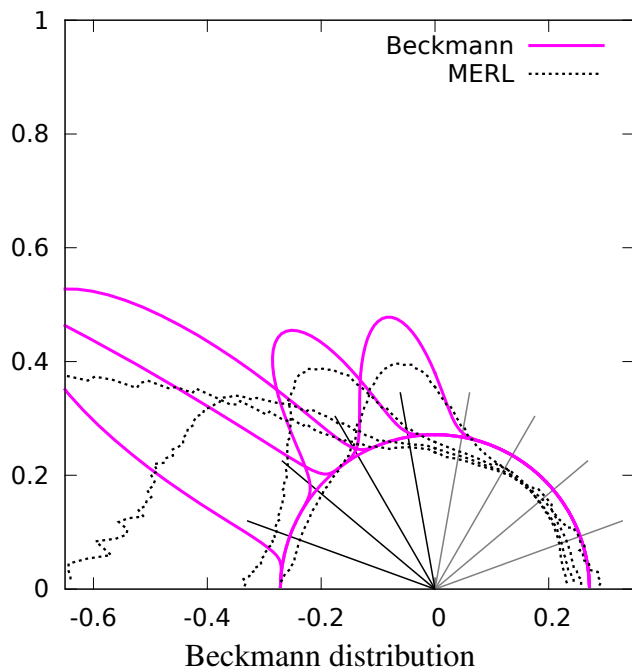
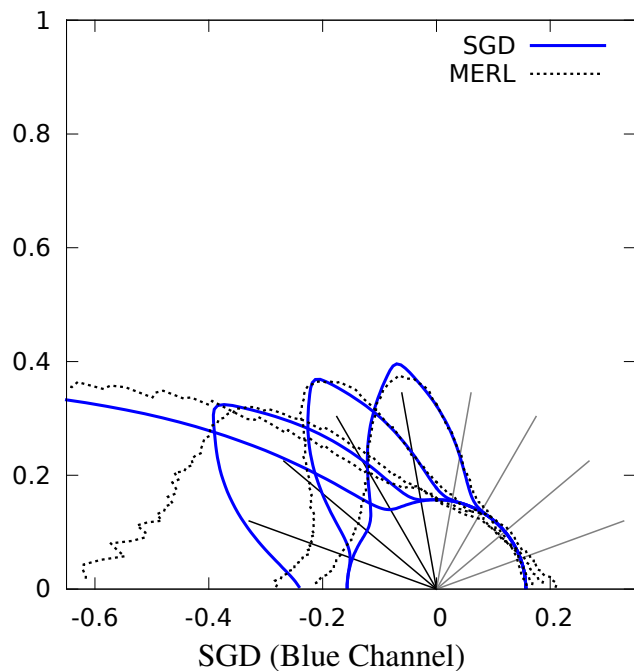
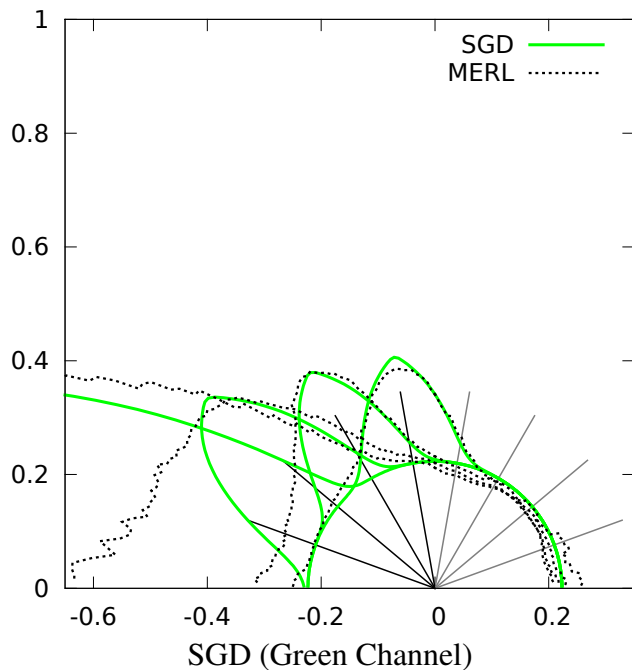
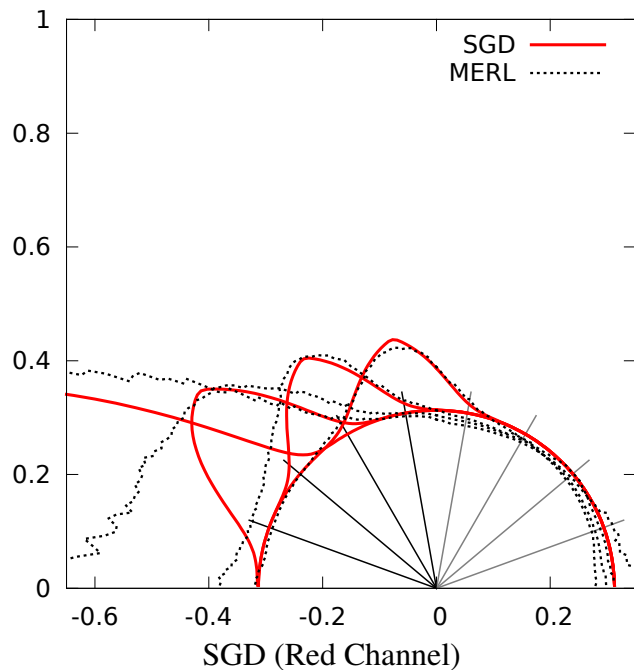
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0961753	0.0781649	0.0137282	0.0491415	0.0522205	-0.0277529	71.8965	0.00465507
Green	0.0349012	0.0898869	0.0154247	0.0673163	0.0456428	-0.0308045	63.4418	0.00387214
Blue	0.0121752	0.111321	0.0233645	0.149331	0.0279324	-0.0492147	40.2168	0.00295941

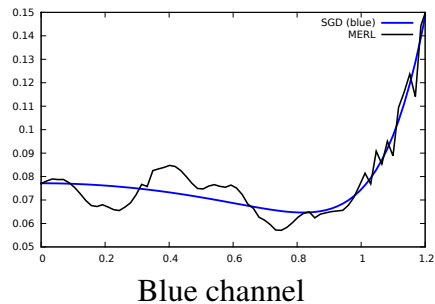
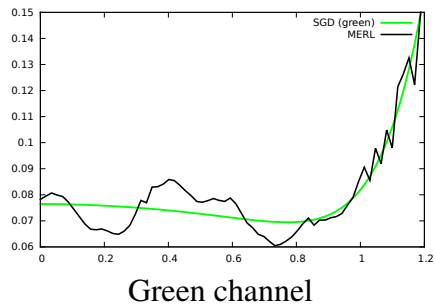
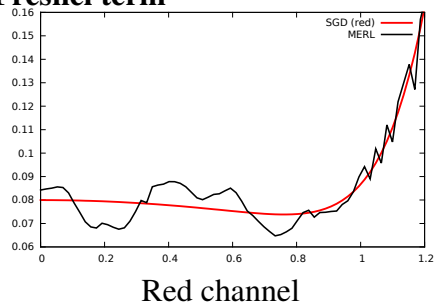
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.3511	224.515	20.2337	0.874926
Green	6.32932	48.774	21.0421	0.811948
Blue	6.32009	0.0171617	25.7335	0.483785

BRDF lobes in the incidence plane (Cubic root applied)

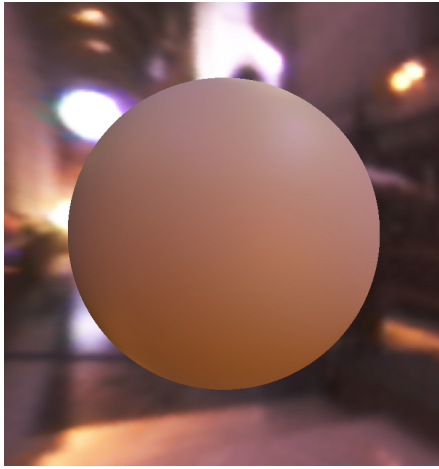


Fresnel term



Material Name: *neoprene-rubber*

Rendered Images



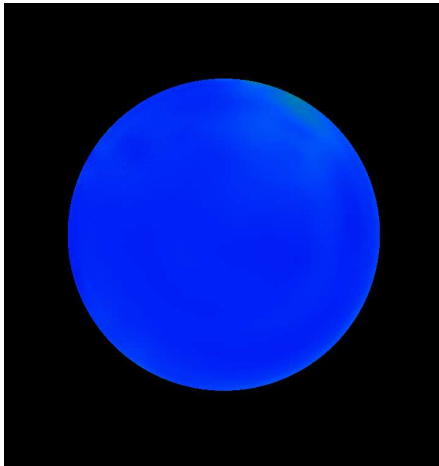
SGD



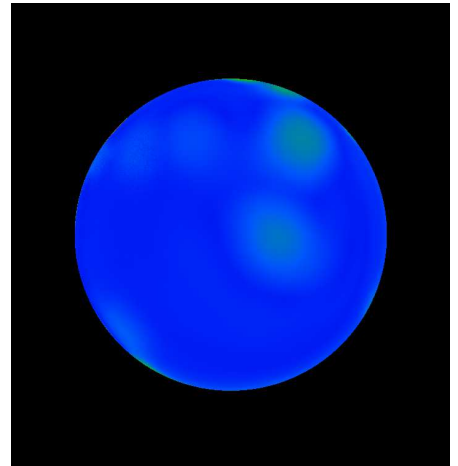
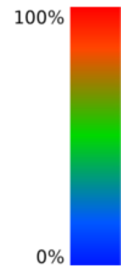
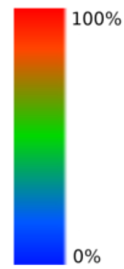
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

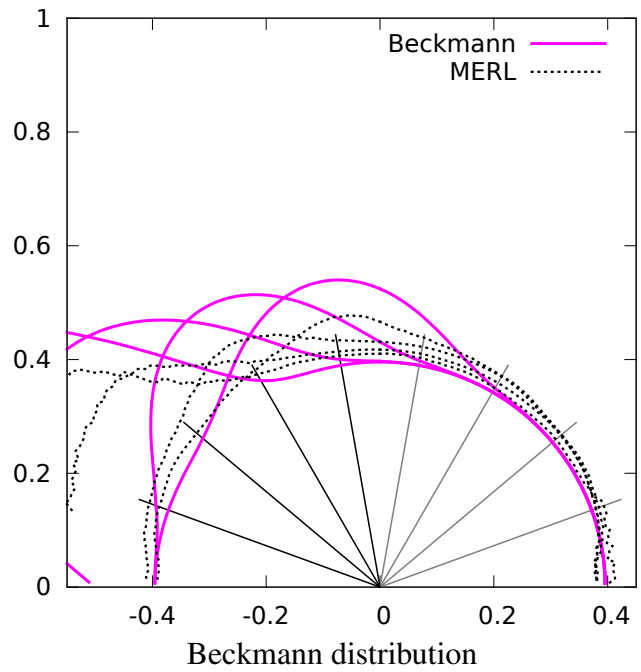
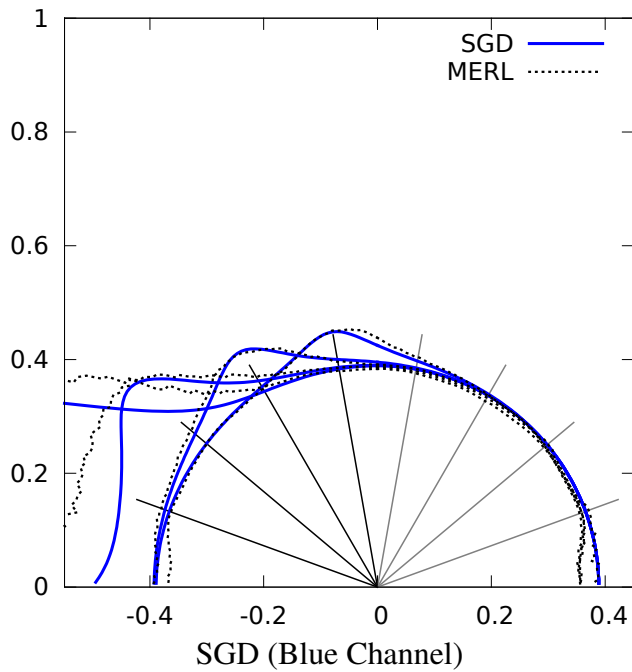
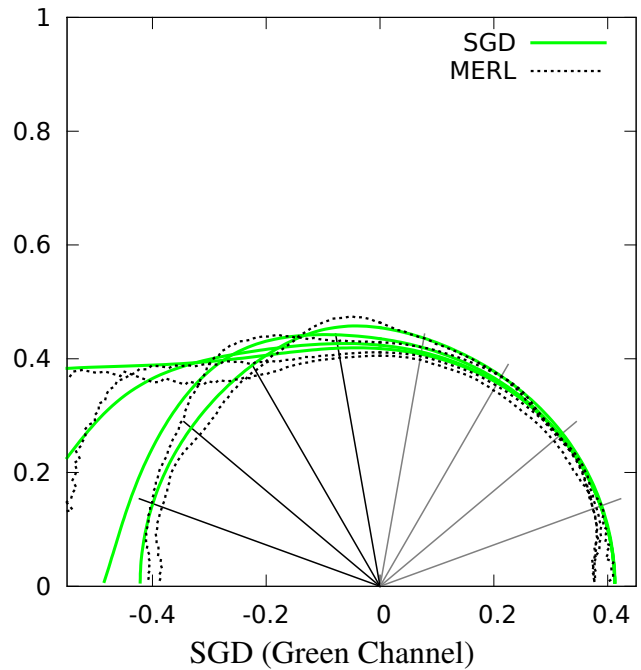
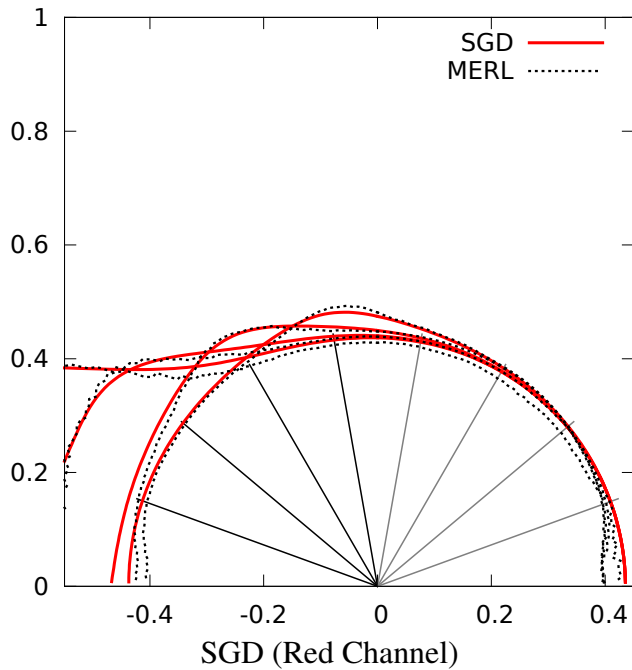
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.259523	0.275058	0.143818	0.770284	0.113041	0.060346	5.56845	0.00218754
Green	0.220477	0.391429	0.207586	0.774203	0.110436	0.0565499	4.61088	0.00314666
Blue	0.184871	0.0753145	0.0764912	0.700644	0.16895	0.0788468	8.84784	0.00180987

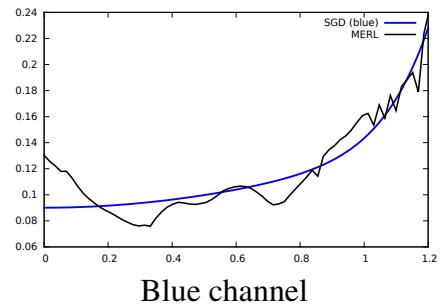
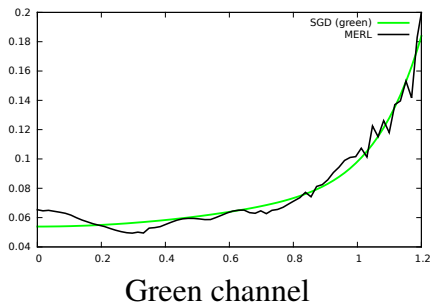
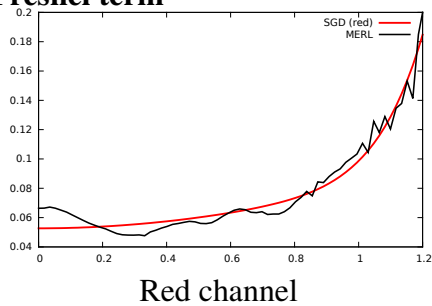
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.02411	5.3042e-08	23.2109	-0.379072
Green	3.82334	1.01087e-07	20.1103	-0.500903
Blue	2.38942	6.70643e-08	28.3099	-0.156114

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

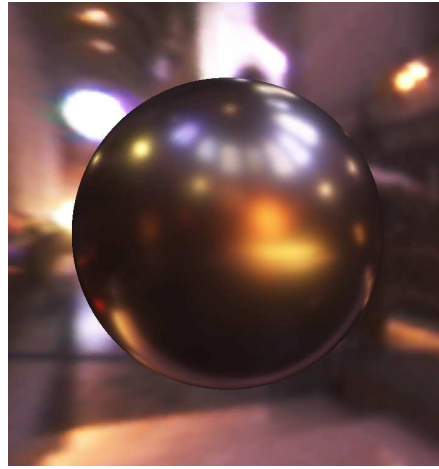


Material Name: *nickel*

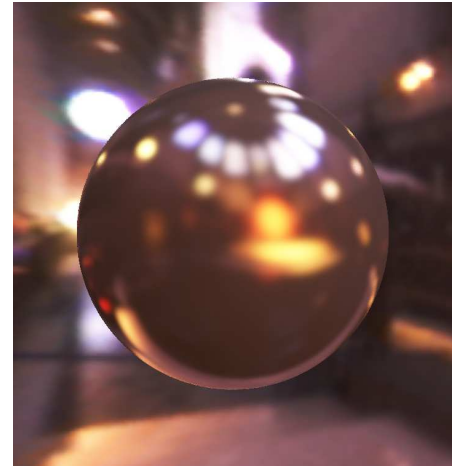
Rendered Images



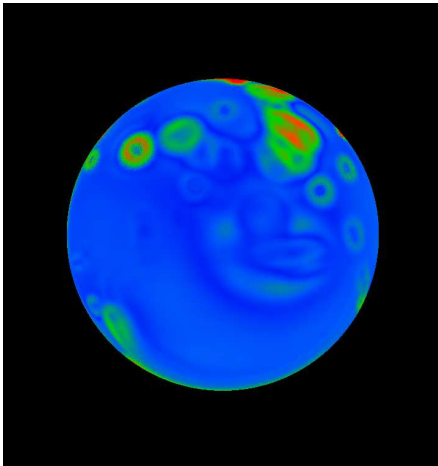
SGD



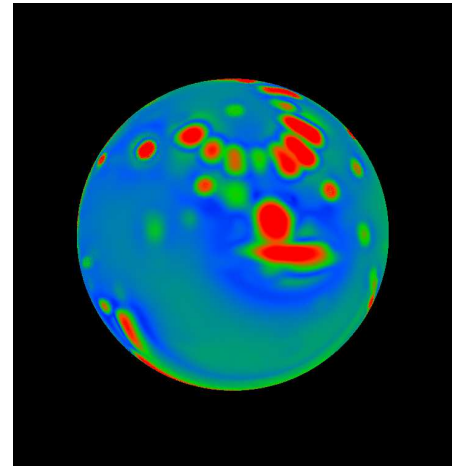
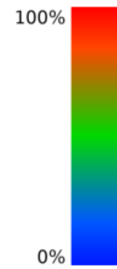
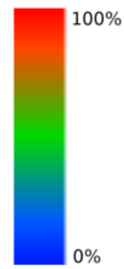
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

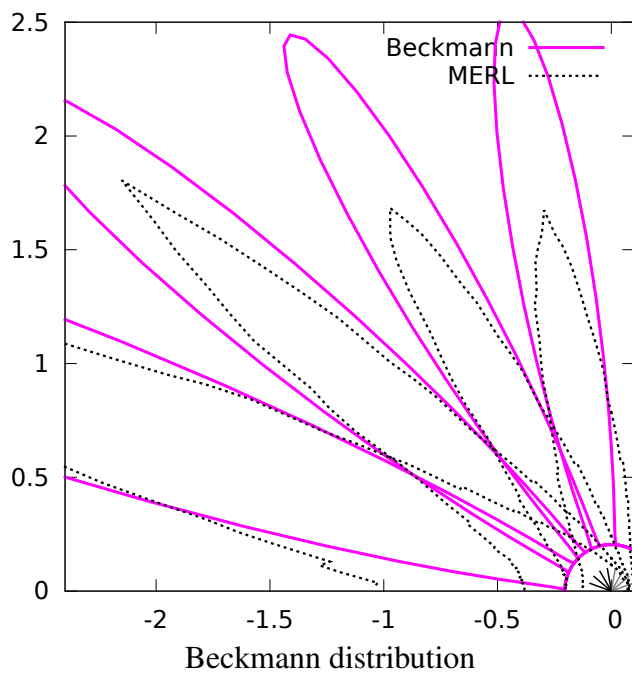
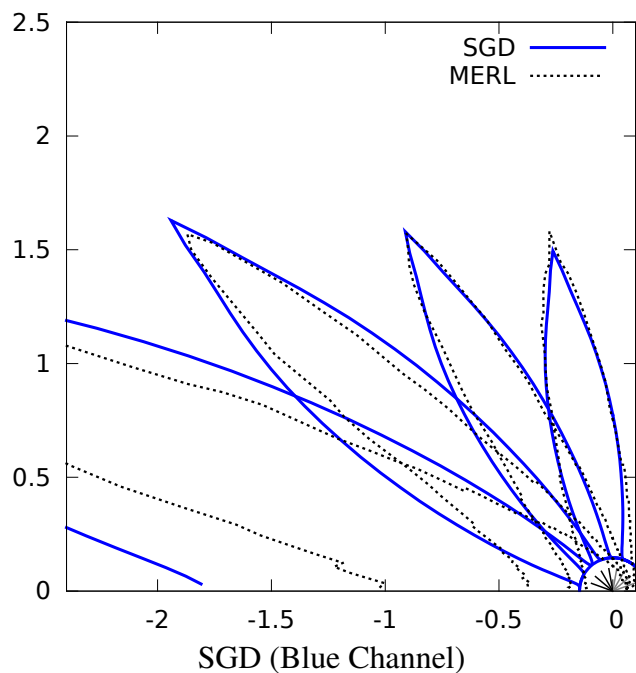
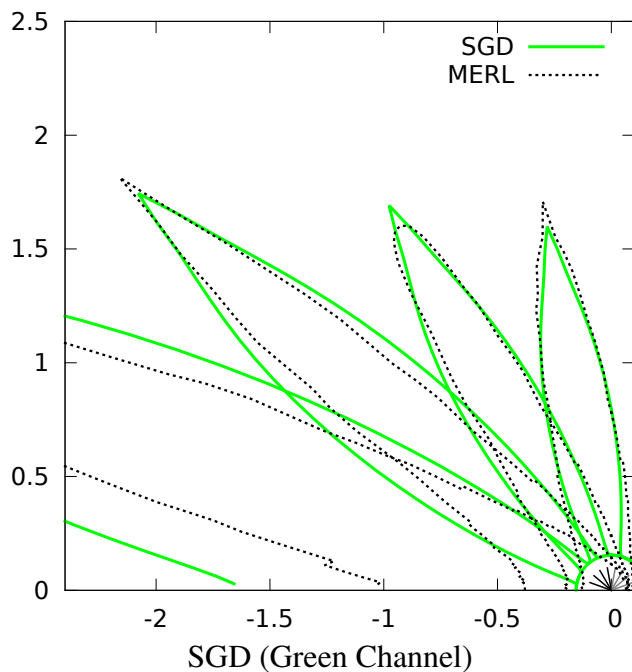
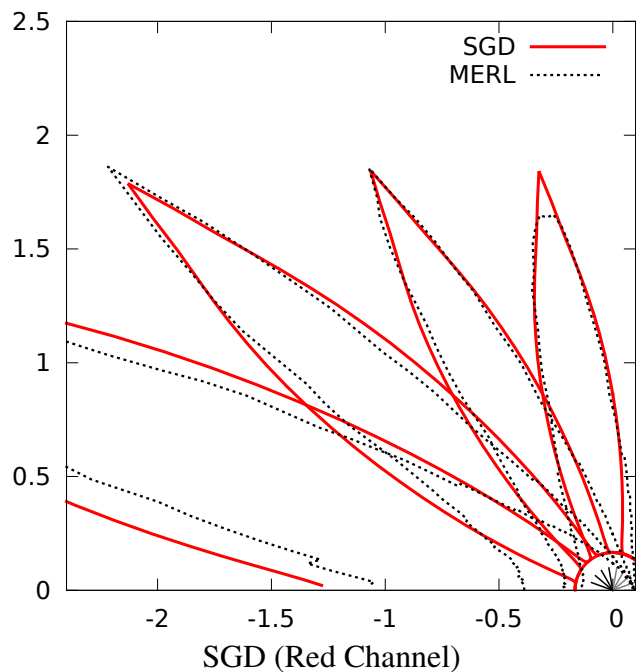
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0144009	0.157696	0.00556292	0.171288	2.21884	1.21884	160.907	0.132612
Green	0.0115339	0.293022	0.00627392	0.168324	1.61986	1.22103	143.234	0.177506
Blue	0.00989042	0.450103	0.00660563	0.161023	0.931645	0.698939	136.933	0.155358

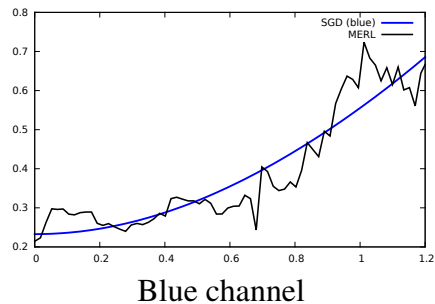
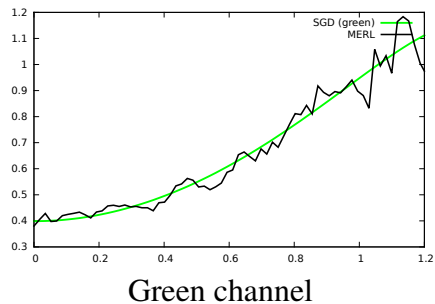
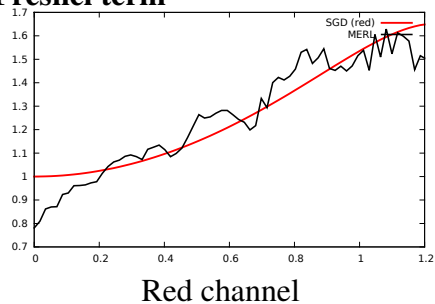
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.76252	16179.3	36.1378	0.846825
Green	6.76447	3451.04	35.1378	0.821209
Blue	6.76278	3453.27	33.614	0.830948

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *nylon*

Rendered Images



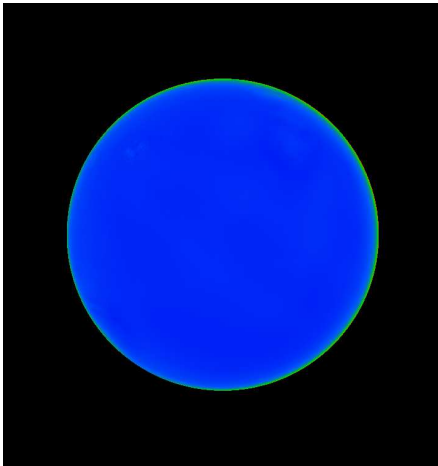
SGD



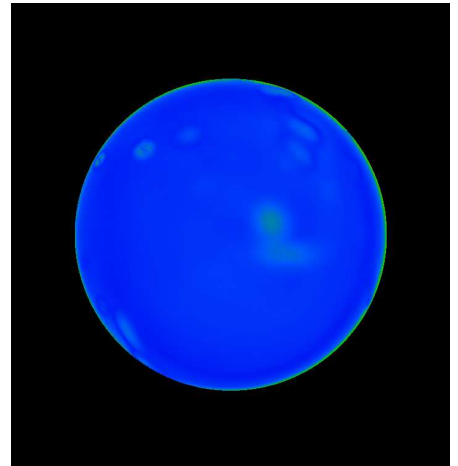
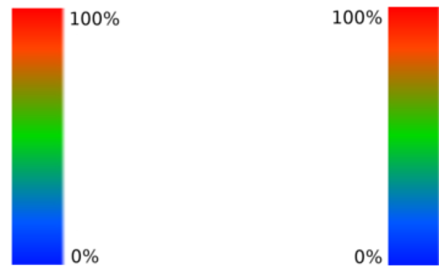
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

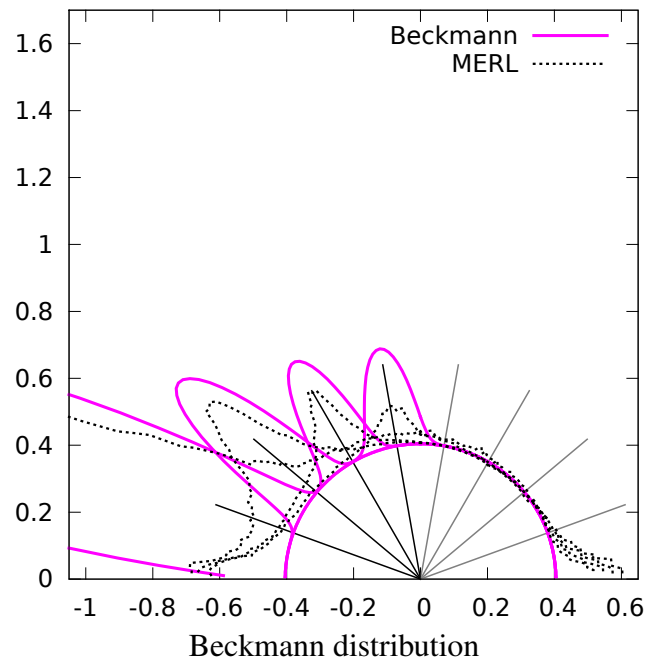
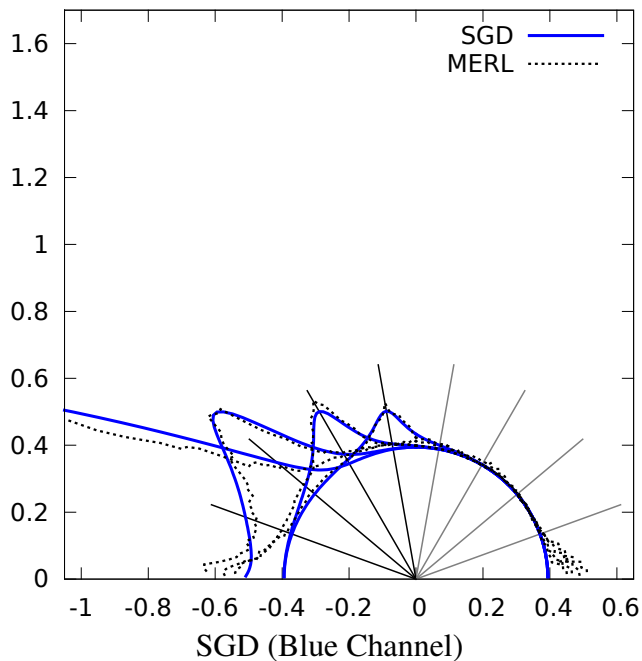
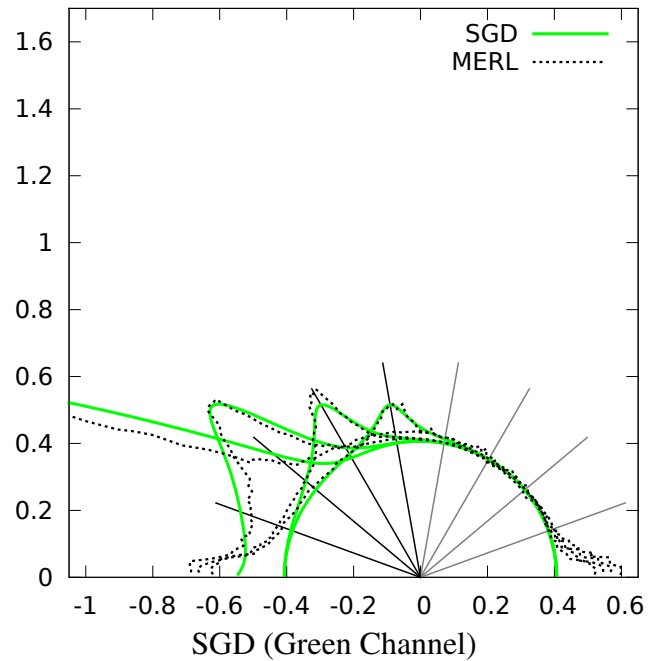
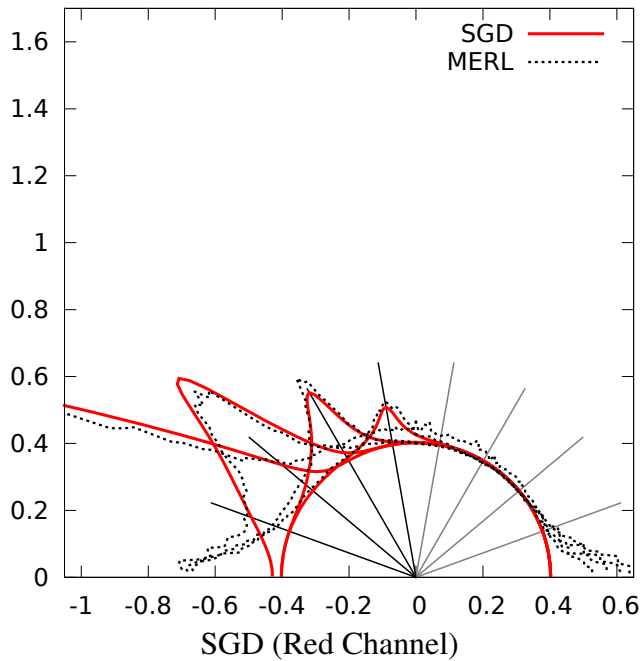
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.204199	0.156797	0.0250344	0.528875	0.240279	0.219191	26.4669	0.00830775
Green	0.211192	0.303324	0.0436802	0.617086	0.117115	0.0940848	14.8484	0.00885046
Blue	0.19234	0.236394	0.0421753	0.620808	0.127421	0.101339	15.213	0.00645556

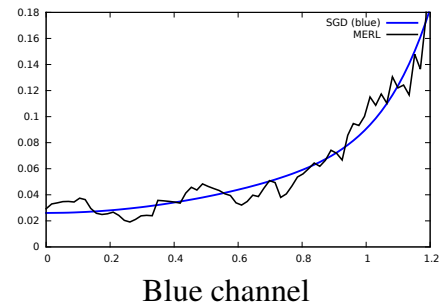
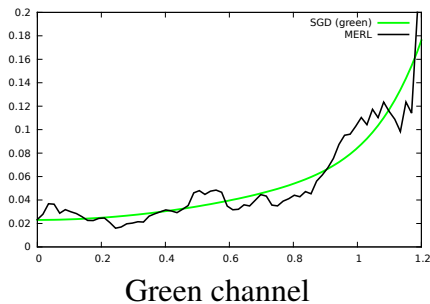
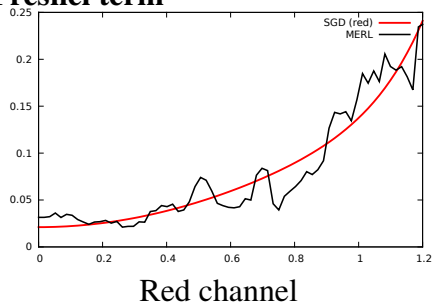
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.32486	1.17309e-07	39.9707	0.11793
Green	2.22618	5.34378e-08	33.9774	-0.0190508
Blue	2.18663	6.68165e-08	34.3152	-0.00222626

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *orange-paint*

Rendered Images



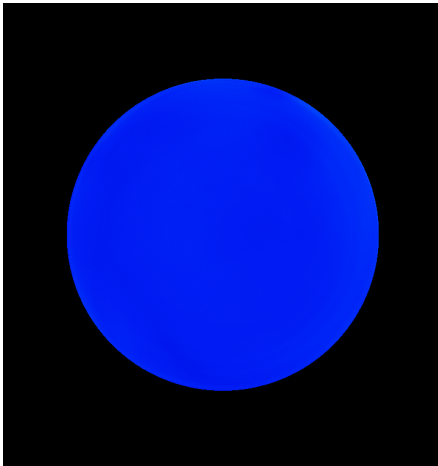
SGD



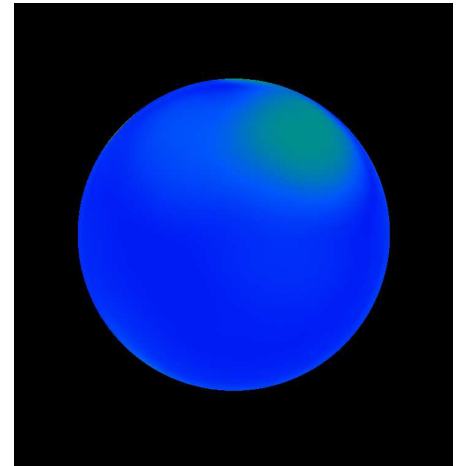
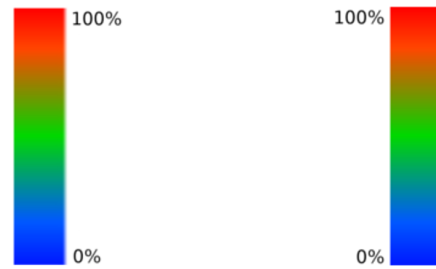
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

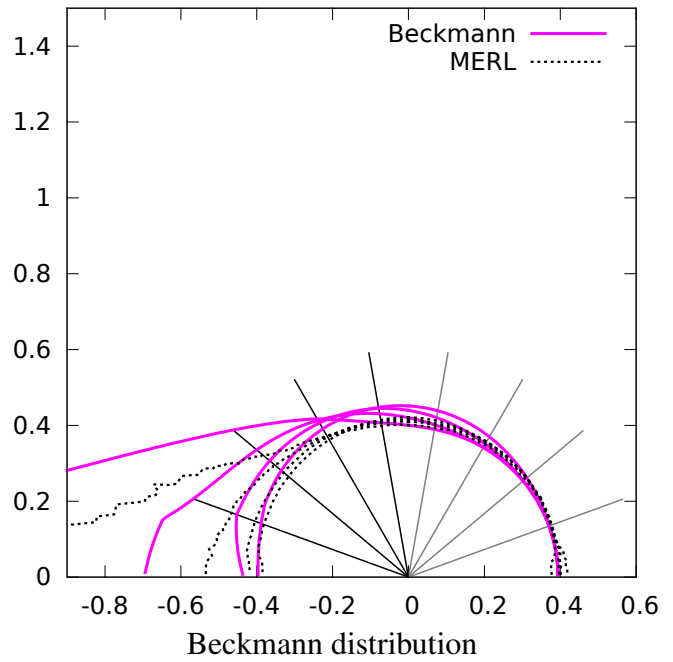
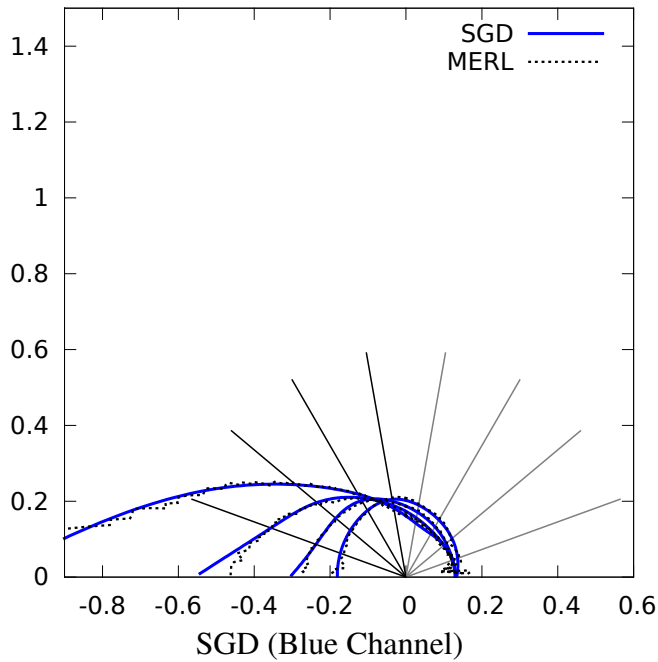
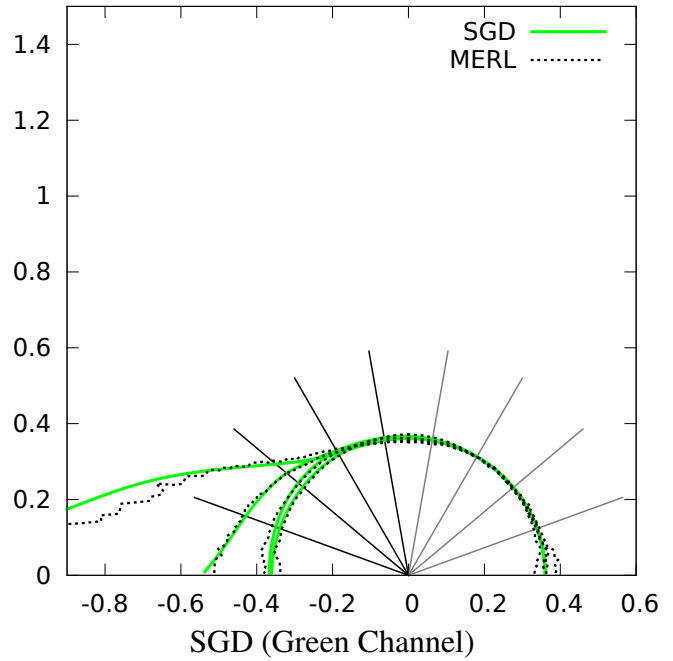
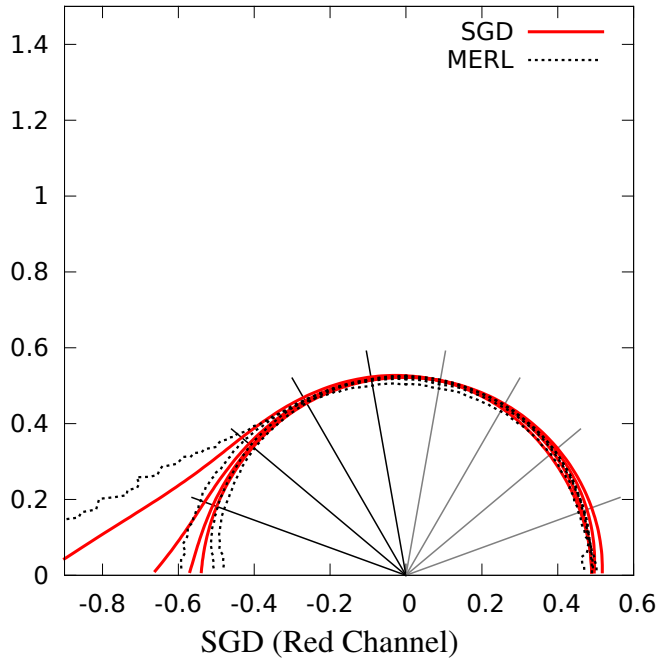
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.368088	0.524979	0.818115	1.44385	6.92565e-13	-0.174318	4.57466	0.00178442
Green	0.147113	0.116386	0.064743	0.0709512	0.106161	0.0934385	16.0185	0.000789226
Blue	0.00692426	0.199437	0.229391	0.483597	0.102279	0.0625648	4.96427	0.000301814

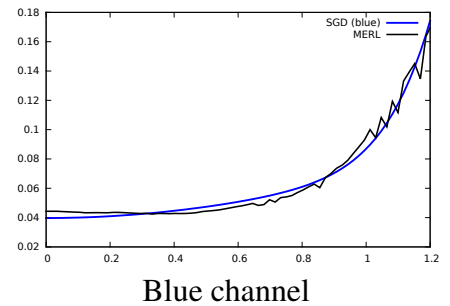
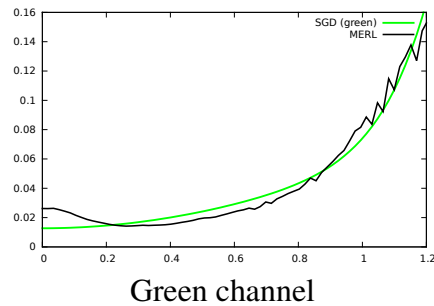
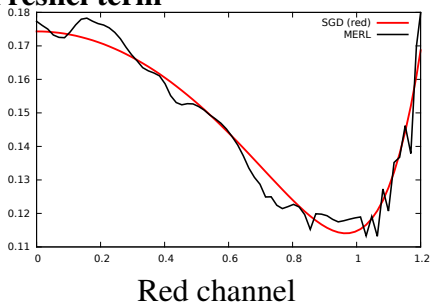
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.84547	0.072629	5.96872	0.222125
Green	4.70387	0.0299825	14.9466	0.438216
Blue	3.6232	0.000333551	13.2194	-0.0759733

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *pearl-paint*

Rendered Images



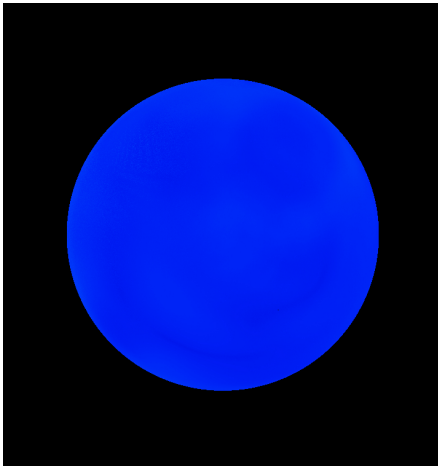
SGD



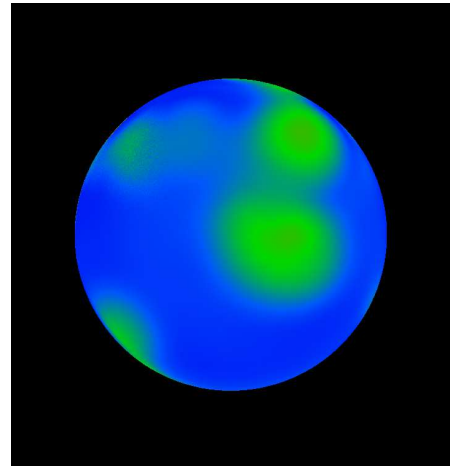
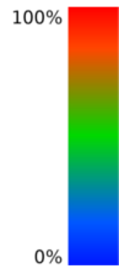
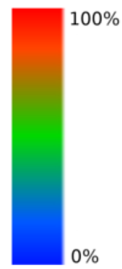
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

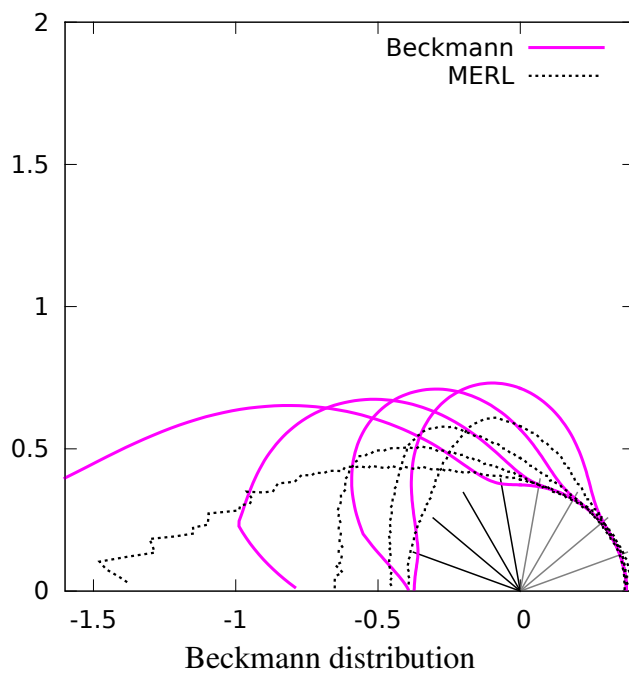
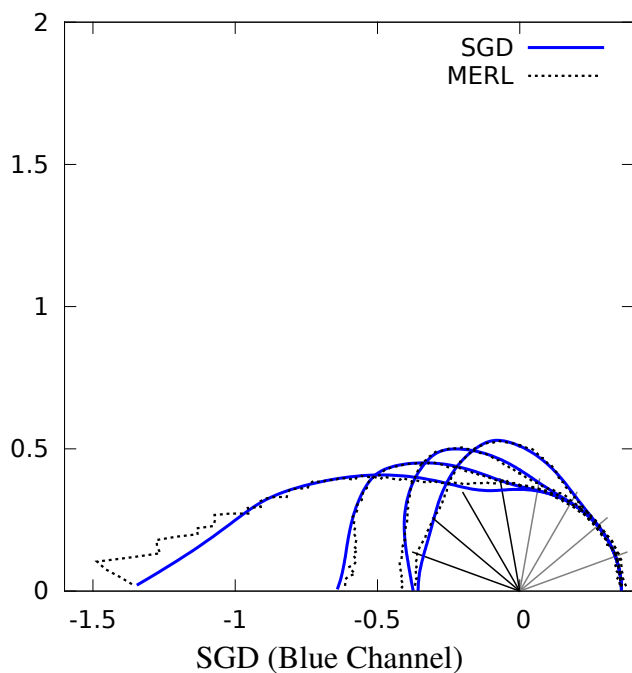
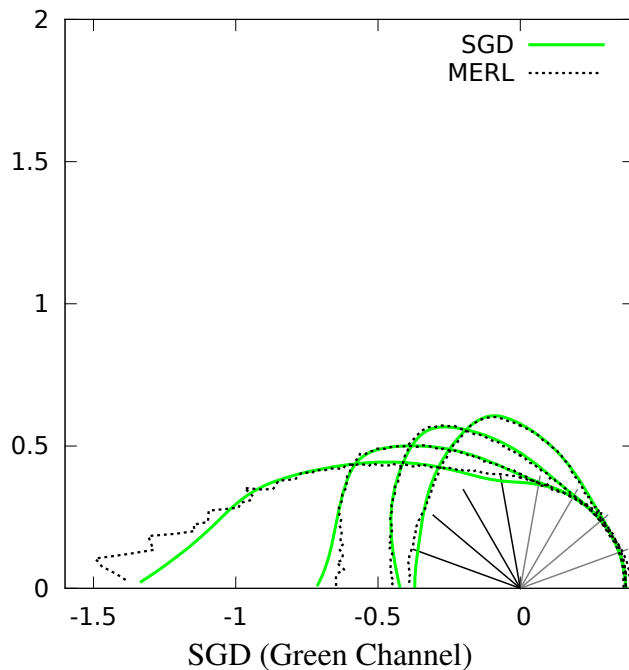
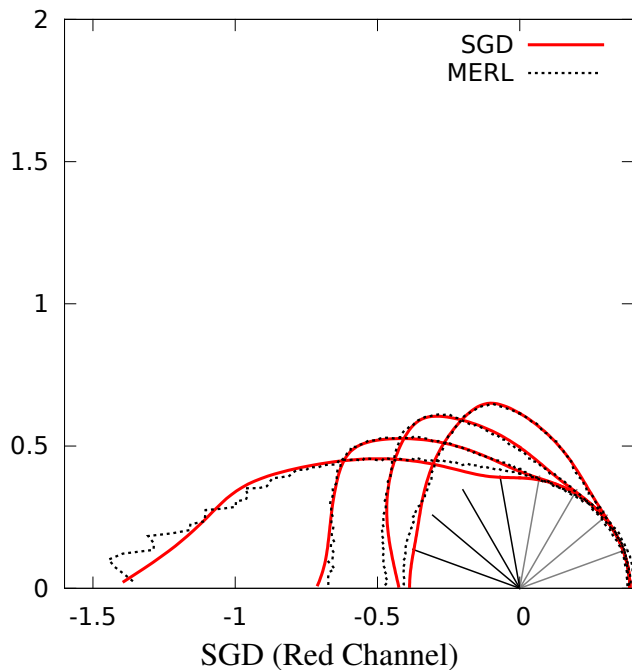
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.181967	0.105133	0.0724063	0.194454	0.168966	-0.831034	13.6335	0.00244402
Green	0.159068	0.0928717	0.0808503	0.203296	0.297431	-0.702569	12.3113	0.00167924
Blue	0.143348	0.0802367	0.0596139	0.091958	0.401185	-0.226546	17.1256	0.0012928

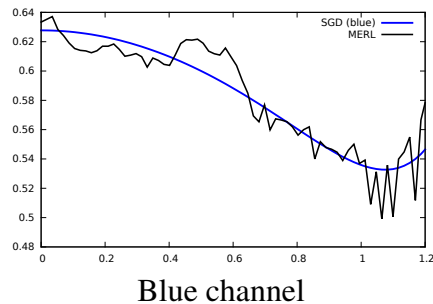
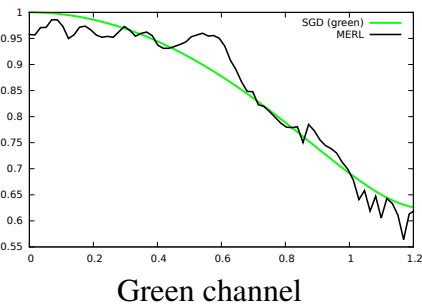
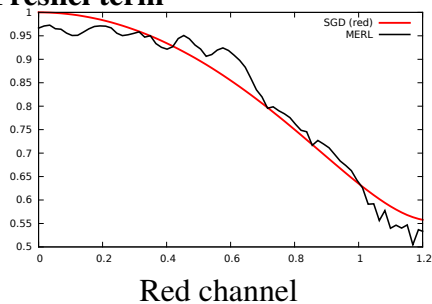
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	5.07525	0.000252814	18.9547	0.156731
Green	4.9097	0.000258641	18.2047	0.135808
Blue	4.92468	0.0180128	16.1366	0.415562

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *pickled-oak-260*

Rendered Images



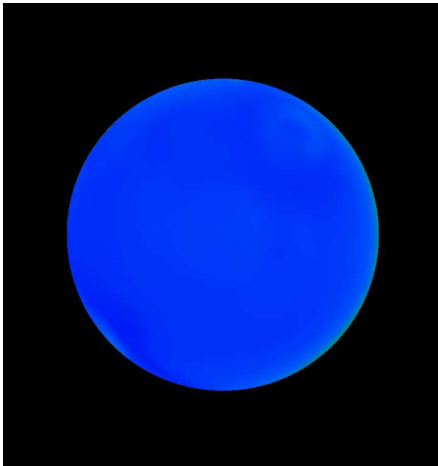
SGD



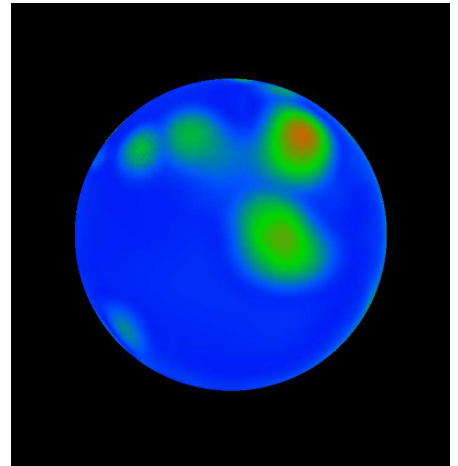
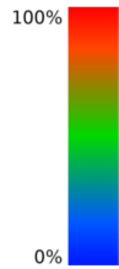
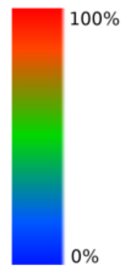
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

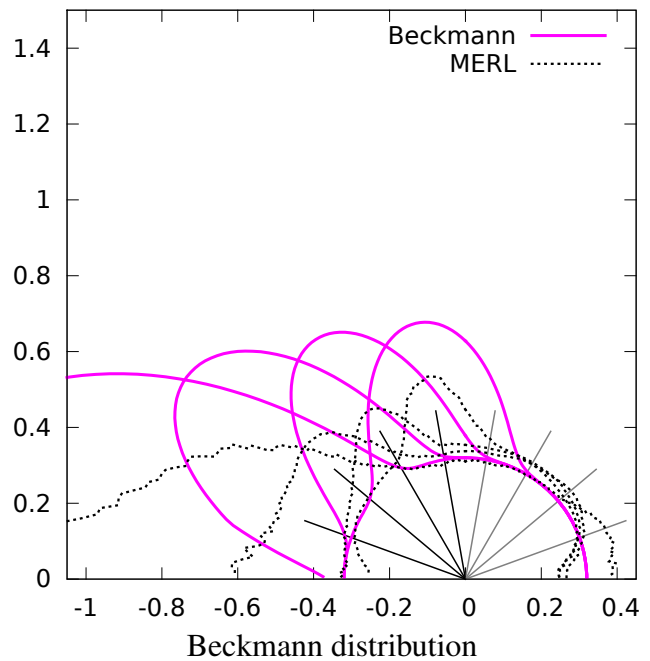
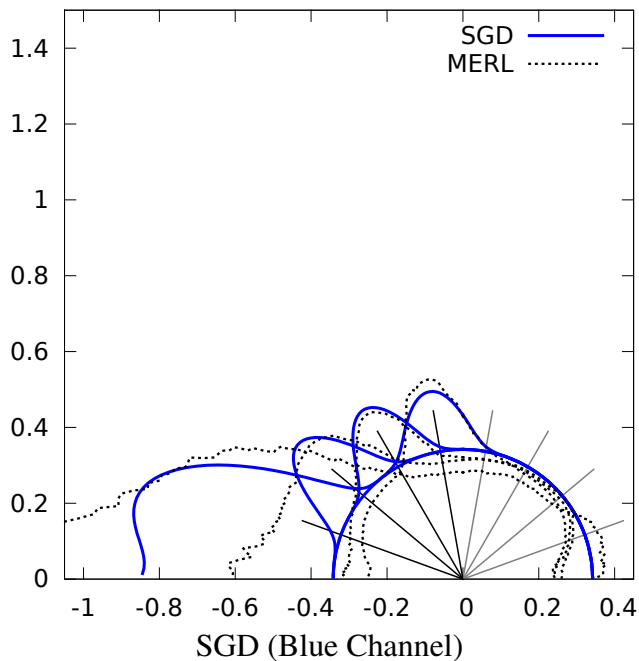
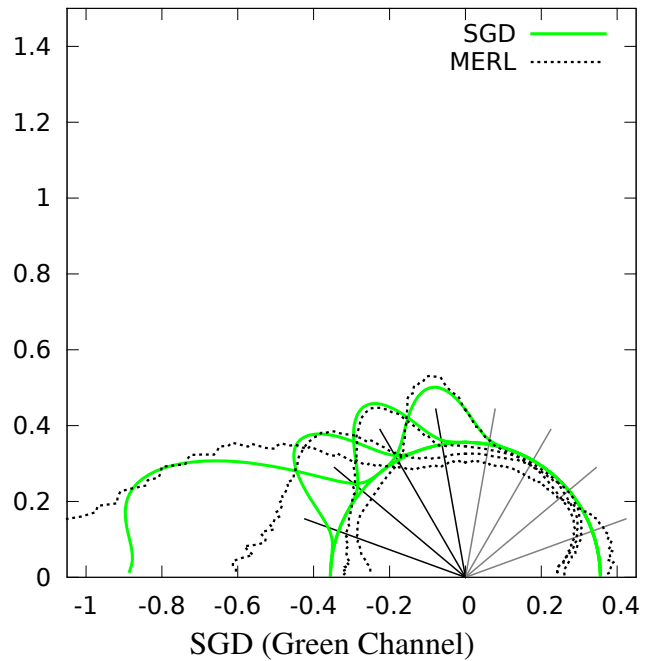
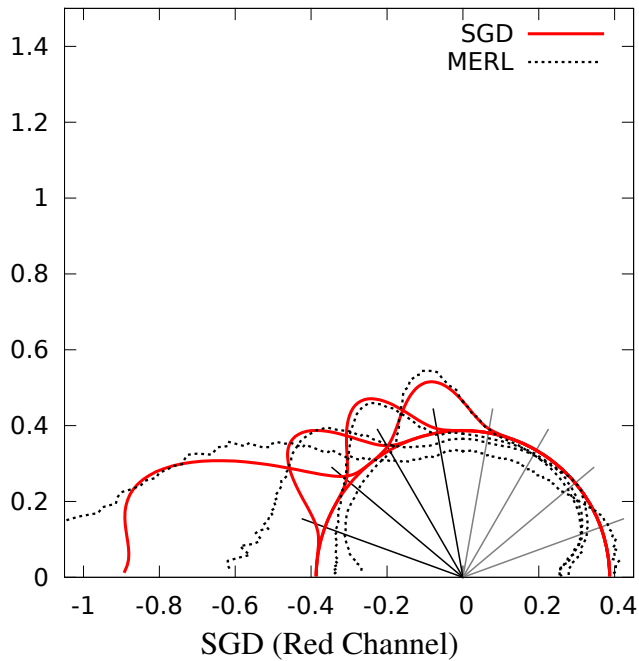
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.181735	0.0283411	0.0105853	2.31337e-14	5.38184e-13	-0.309259	95.4759	0.00336548
Green	0.14142	0.0296418	0.0102771	2.35272e-14	2.15933e-13	-0.291046	98.3089	0.0032891
Blue	0.125486	0.025815	0.0101188	1.99762e-14	3.55496e-12	-0.329625	99.831	0.00330829

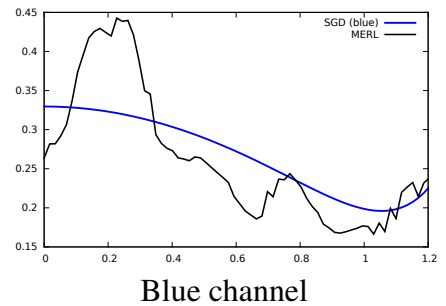
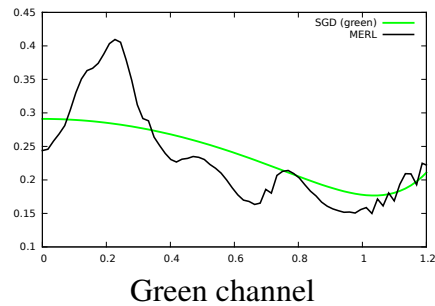
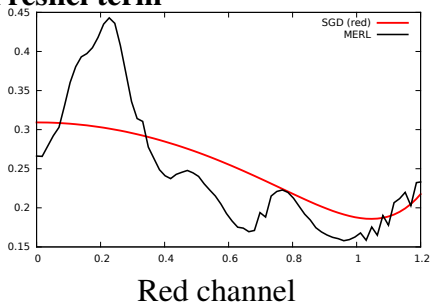
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.37433	4641.15	18.1707	1.00563
Green	6.39032	5970.15	18.2121	1.01274
Blue	6.39857	6818.76	18.2334	1.01645

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *pink-fabric2*

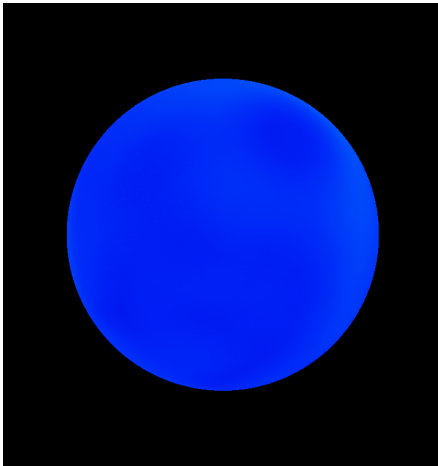
Rendered Images



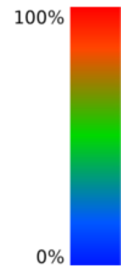
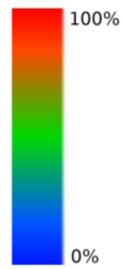
SGD



Reference



SGD (Lab difference)



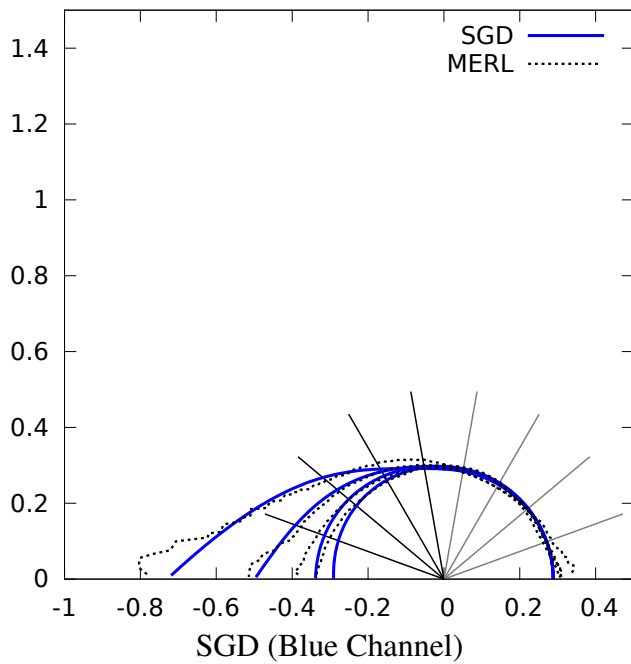
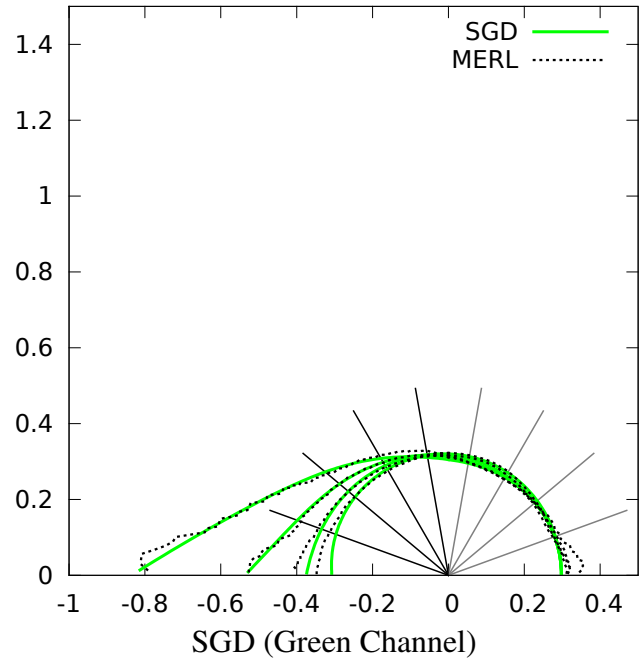
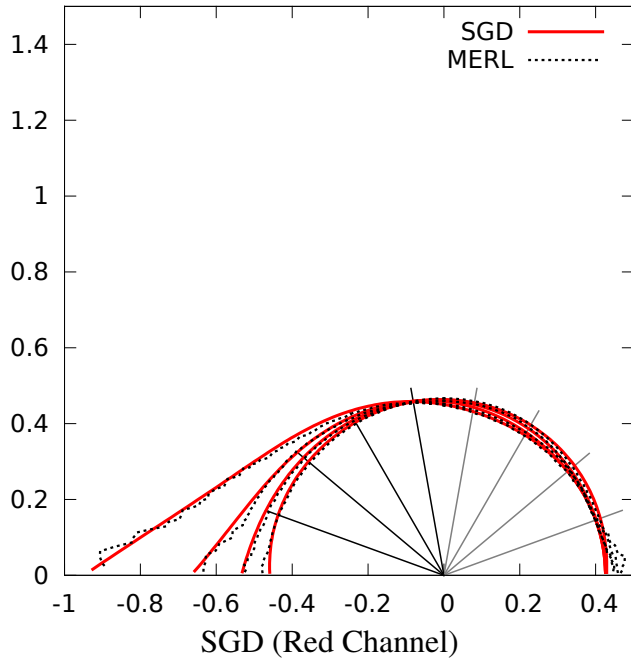
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.24261	0.161823	0.220011	6.44517e-12	0.242032	-0.0582931	5.66376	0.00145188
Green	0.0829238	0.0591236	0.148623	3.24286e-13	0.456181	0.295844	7.80657	0.000903357
Blue	0.0751196	0.00907967	0.111966	3.83556e-11	3.11925	2.84268	9.98941	0.00103814

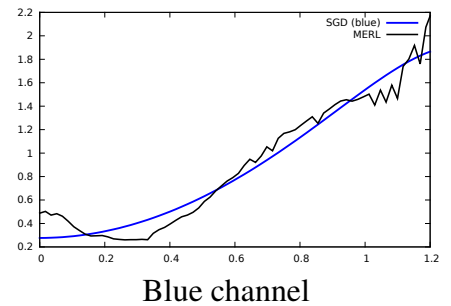
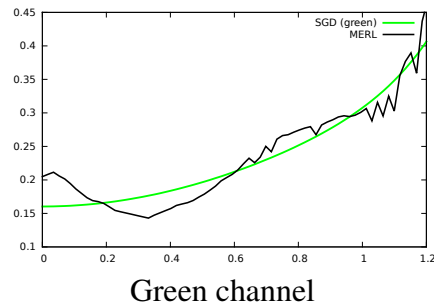
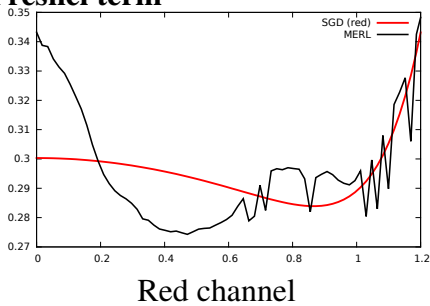
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.43742	0.111404	7.47166	0.408014
Green	3.05804	0.079067	9.23588	0.422779
Blue	3.53392	0.0738938	10.5653	0.448866

BRDF lobes in the incidence plane (Cubic root applied)

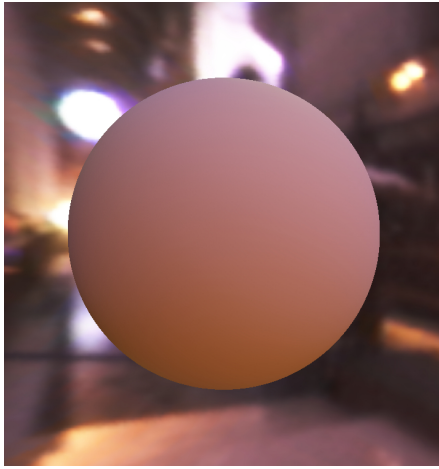


Fresnel term



Material Name: *pink-fabric*

Rendered Images



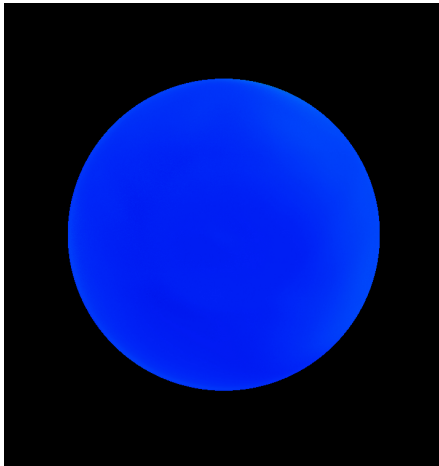
SGD



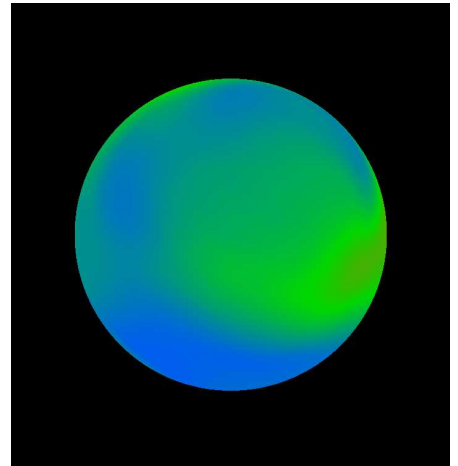
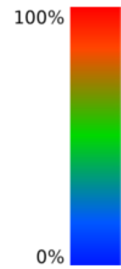
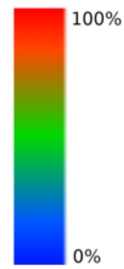
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

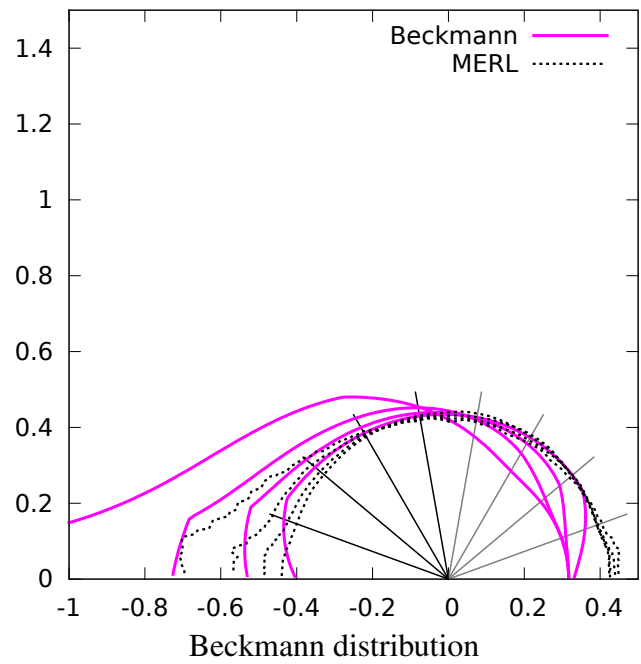
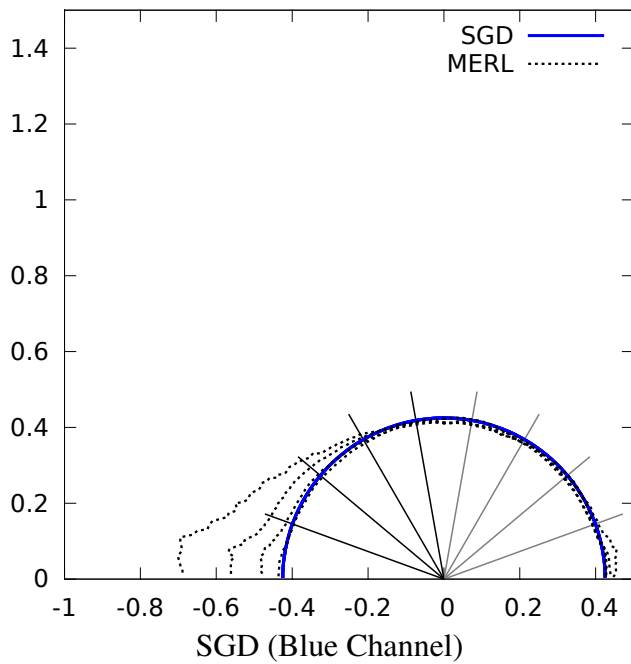
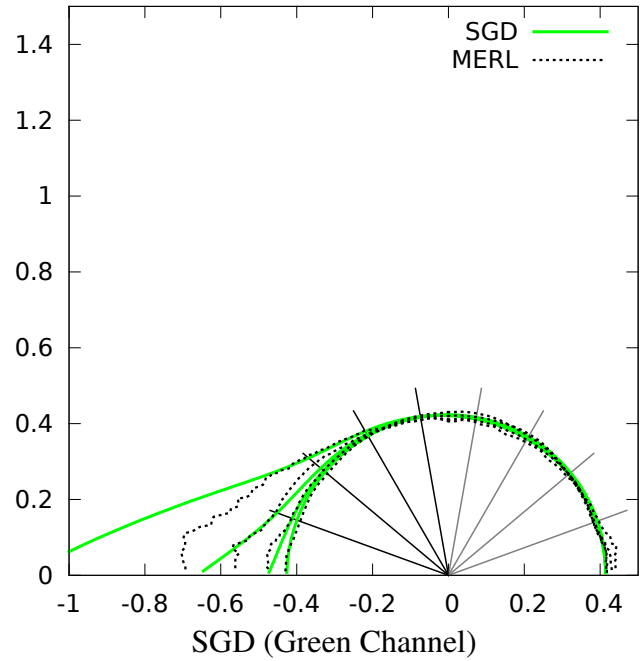
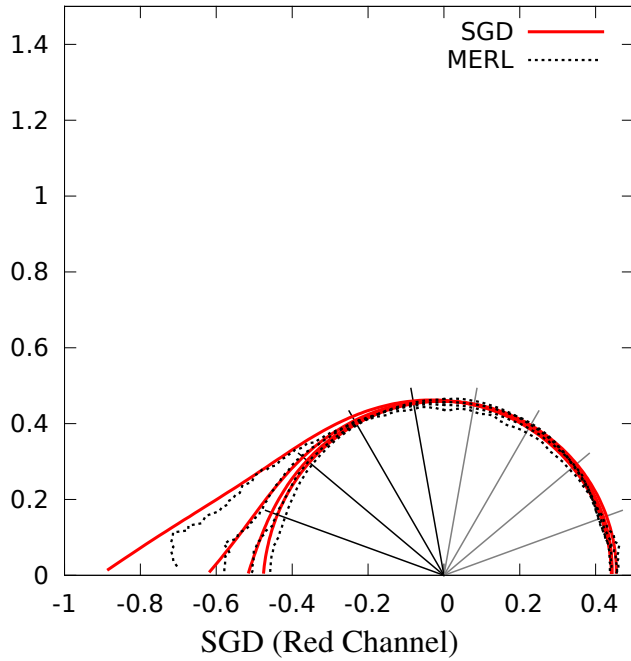
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.270553	0.299998	0.787023	1.77629	0.121124	0.0151107	4.71724	0.00129262
Green	0.223977	0.418074	0.234345	4.64947e-15	0.0271041	0.00273969	5.3941	0.00124216
Blue	0.240993	4.07112e-13	0.17346	0.203846	1	0	6.55218	0.00262093

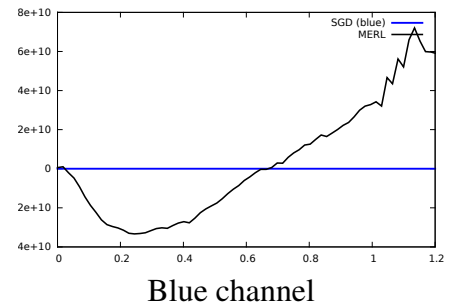
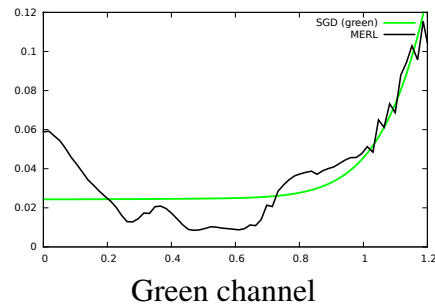
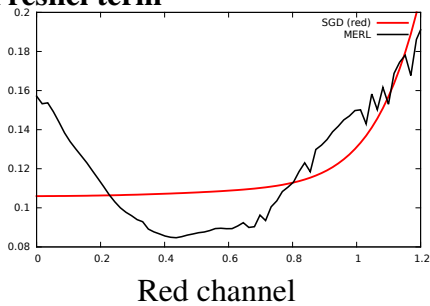
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.23471	0.0266324	7.20596	0.130136
Green	2.34423	0.11955	7.20326	0.407562
Blue	3.31887	0.00966123	11.0696	0.22282

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

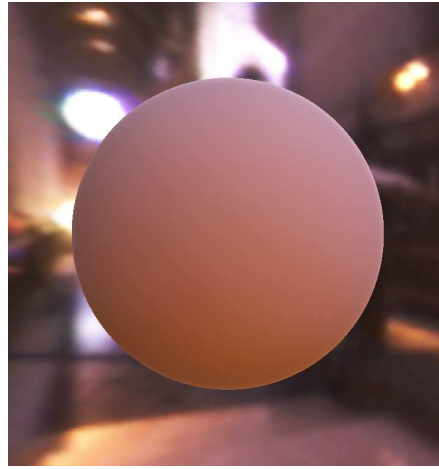


Material Name: *pink-felt*

Rendered Images



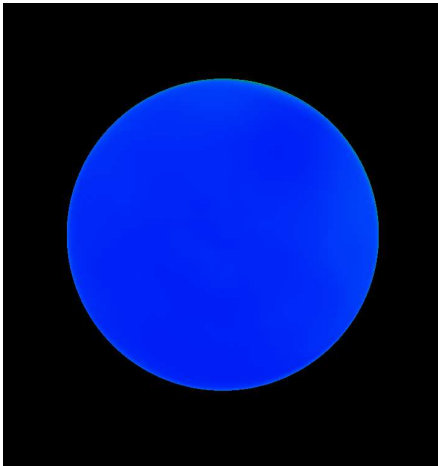
SGD



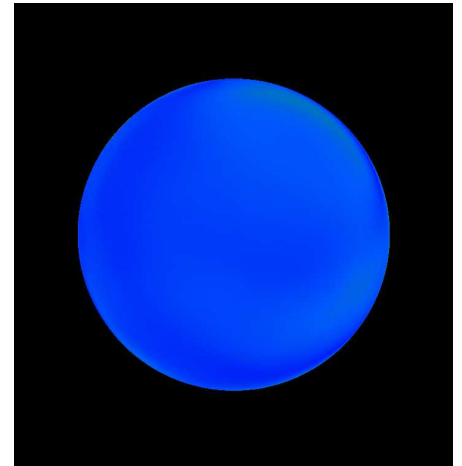
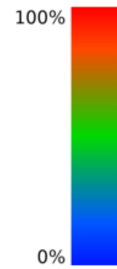
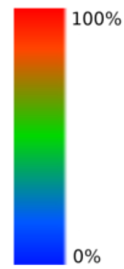
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

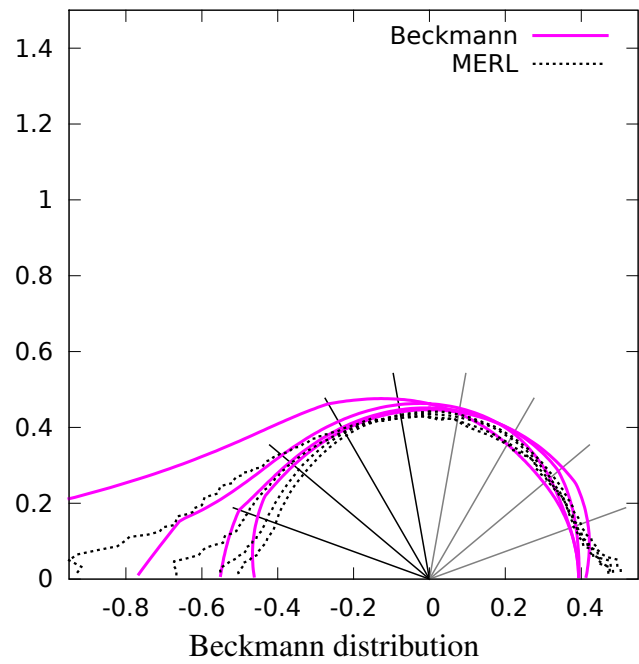
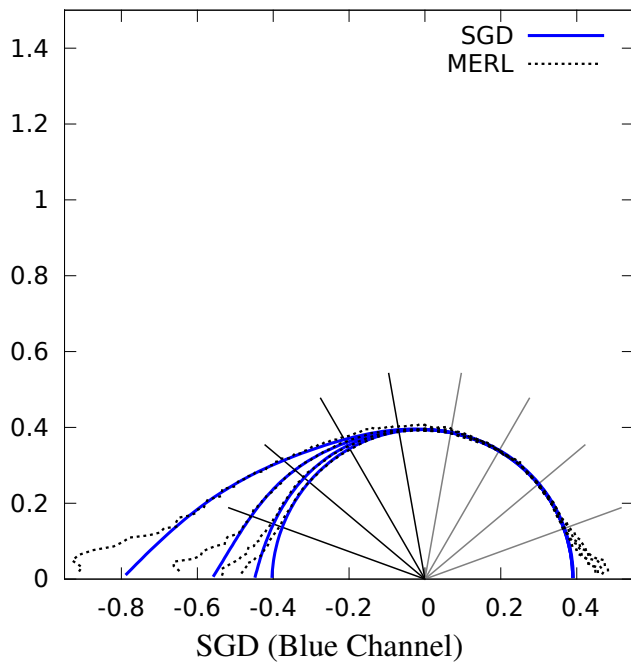
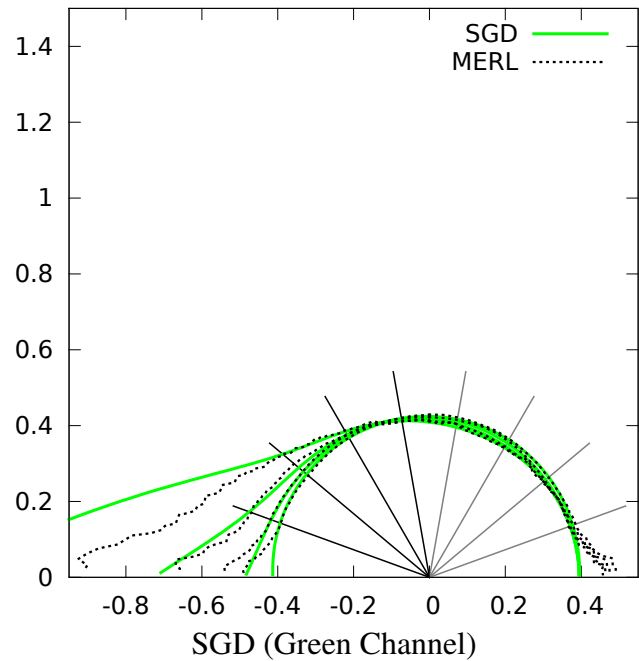
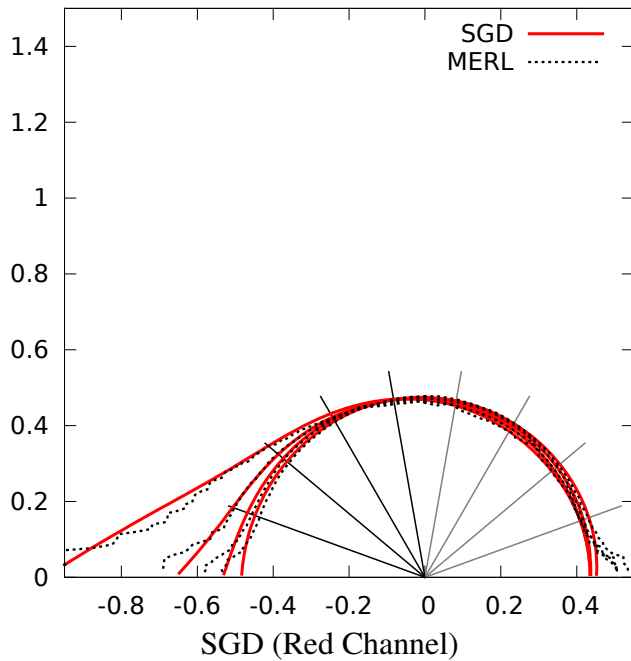
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.259533	0.359813	0.46679	0.663613	0.0530603	-0.124124	3.6266	0.000823299
Green	0.192978	0.533498	0.203504	1.70267e-13	0.0108612	-0.0455941	6.02293	0.00122612
Blue	0.185581	0.0390541	0.314933	0.778919	1.12976	1.05206	3.92458	0.00141316

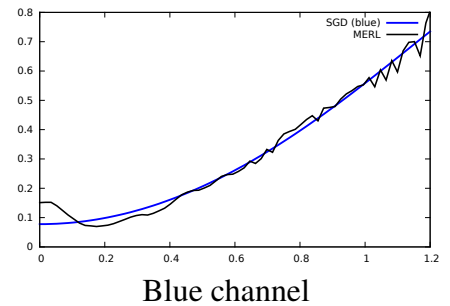
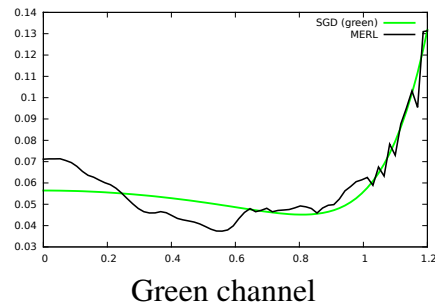
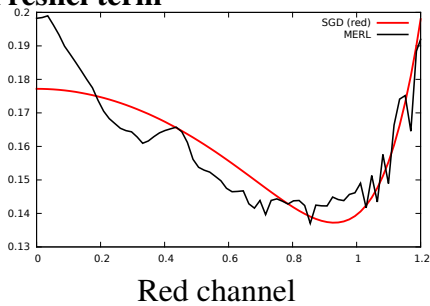
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.22042	0.0333497	7.40195	0.185696
Green	2.55548	0.102524	7.81026	0.409228
Blue	3.68735	8.10122e-05	13.5108	-0.236166

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *pink-jasper*

Rendered Images



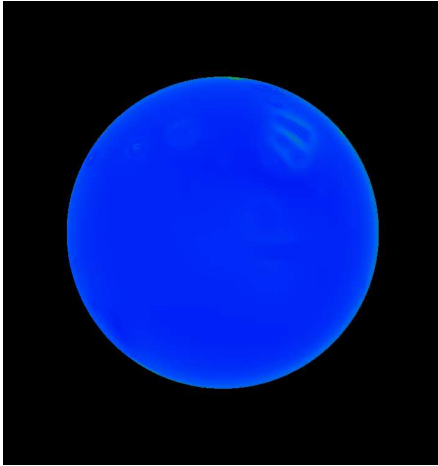
SGD



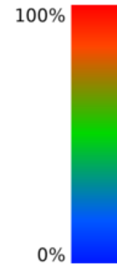
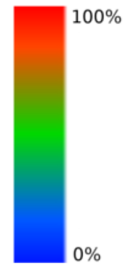
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

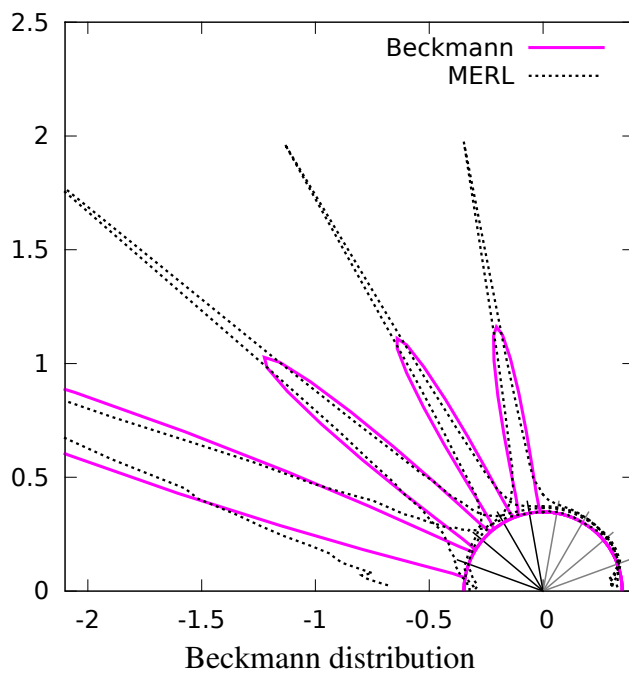
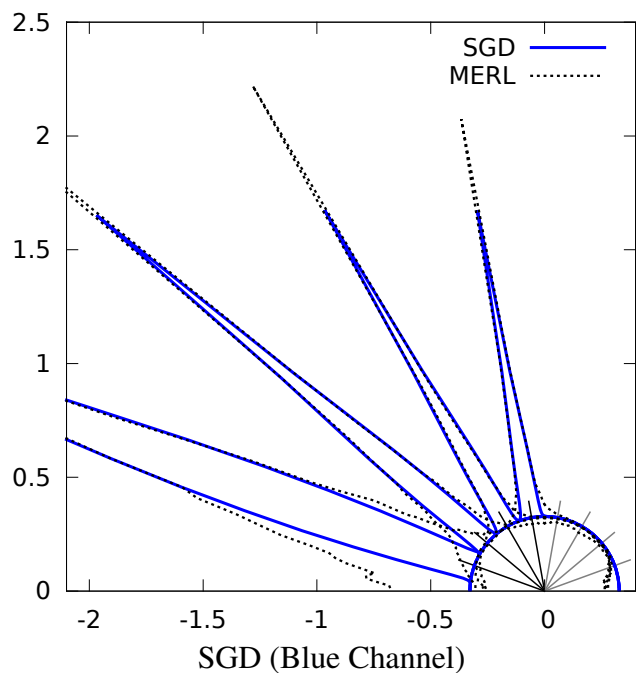
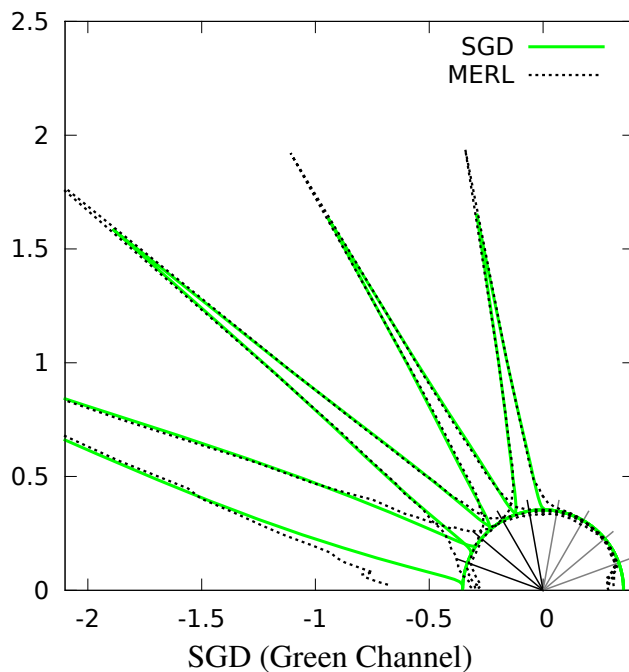
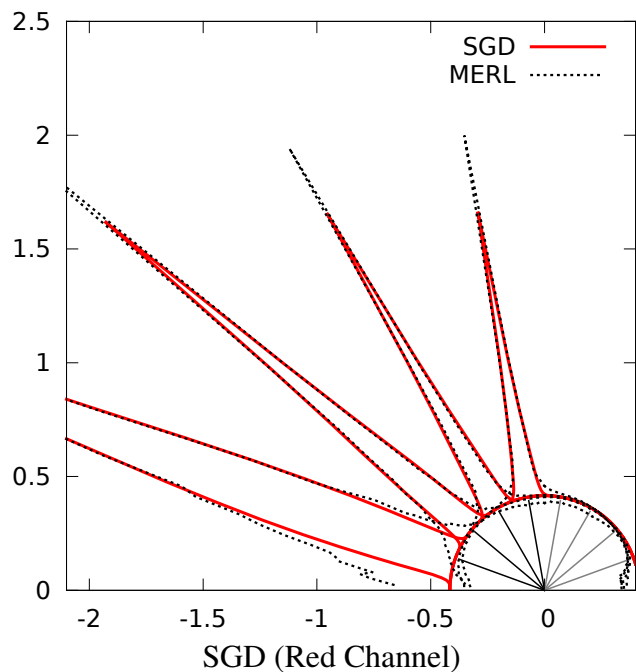
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.226234	0.0846118	0.00223592	0.53138	0.172825	0.0911362	253.003	0.0166667
Green	0.138929	0.0984038	0.00203213	0.4995	0.129714	0.0599408	292.741	0.0194625
Blue	0.110785	0.078693	0.0013737	0.436111	0.154397	0.0851167	474.2	0.0142451

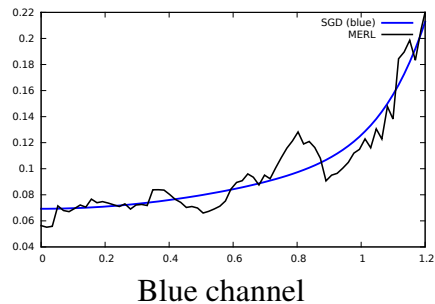
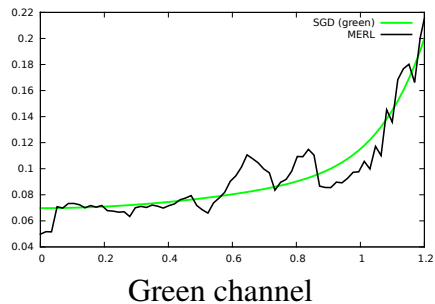
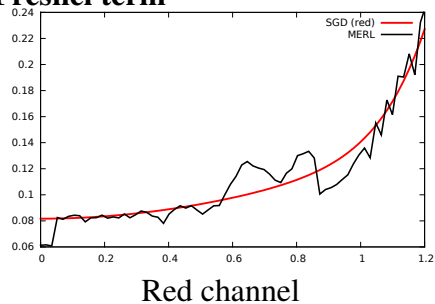
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.64528	5.71153e-08	110.886	0.416268
Green	1.86649	6.24765e-08	113.953	0.422653
Blue	5.29965e-08	15.5452	8.17872	0.561605

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

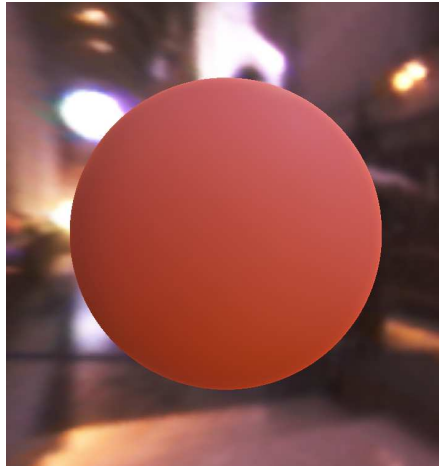


Material Name: *pink-plastic*

Rendered Images



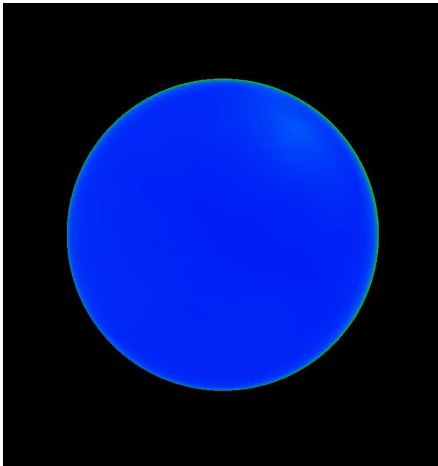
SGD



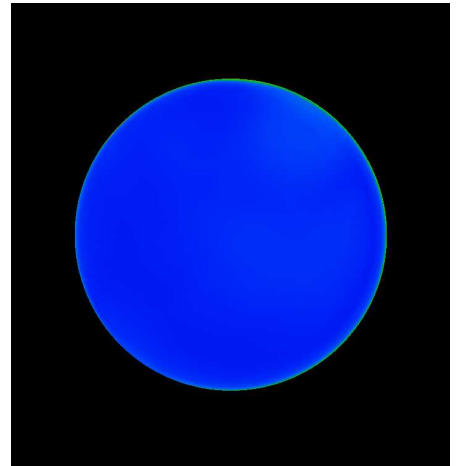
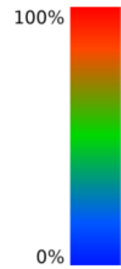
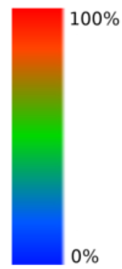
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

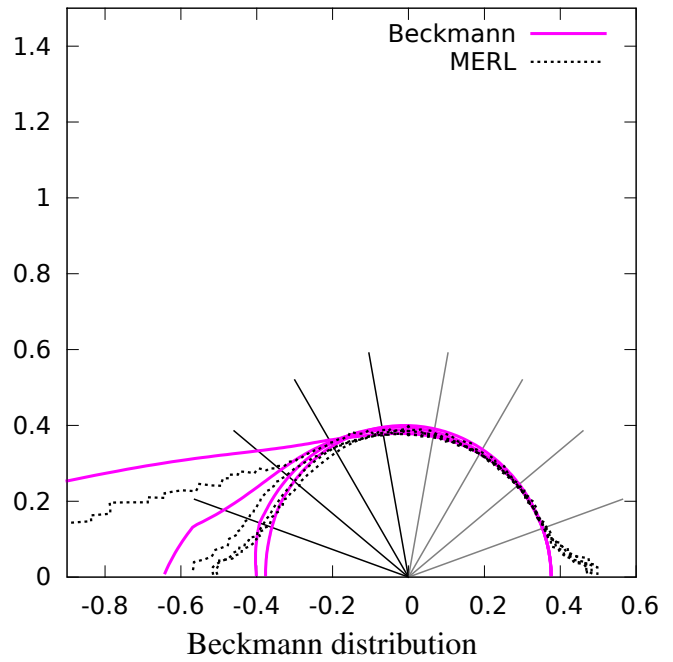
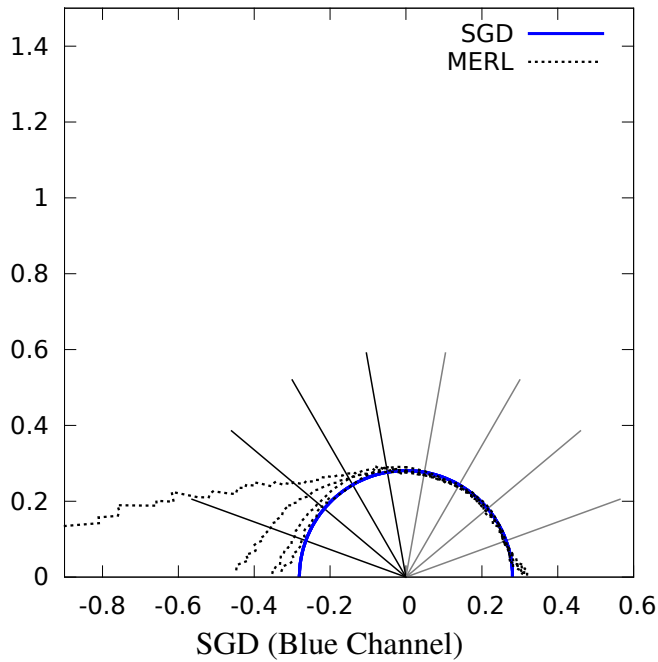
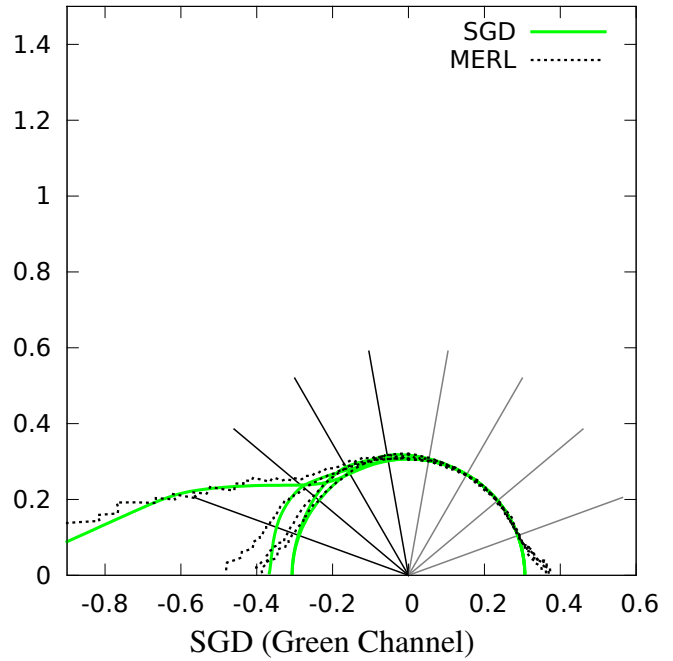
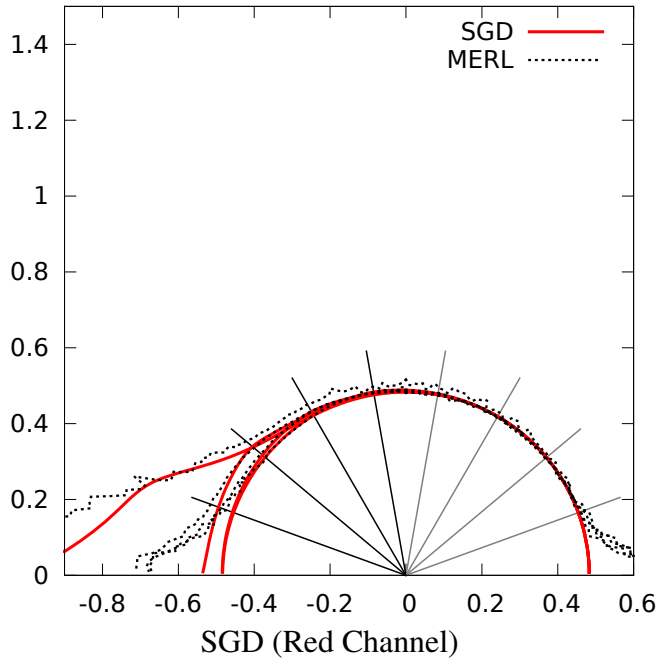
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.354572	0.0316585	0.0566727	0.215149	0.317781	0.266863	16.788	0.00219041
Green	0.0905002	0.0444153	0.0369011	0.0621896	0.0925394	0.0652821	27.3043	0.000905537
Blue	0.0696372	6.36158e-15	0.142628	0.189286	1	0	7.67451	0.00219415

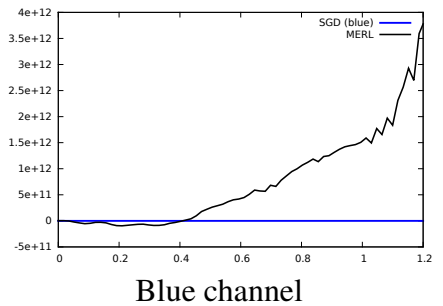
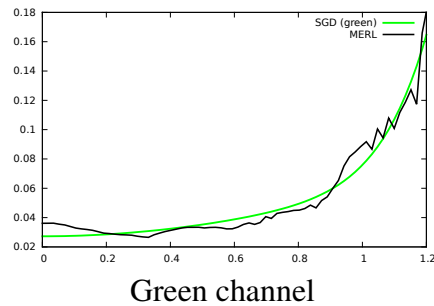
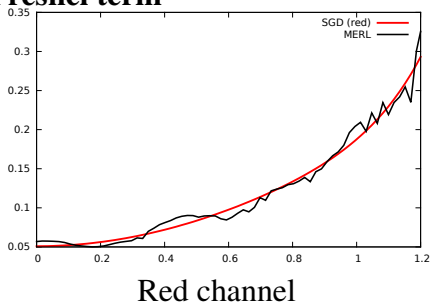
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	5.62766	1.71214e-05	23.0822	0.0833775
Green	5.4919	0.187553	17.5369	0.577298
Blue	3.67439	0.00561921	12.3737	0.215985

BRDF lobes in the incidence plane (Cubic root applied)

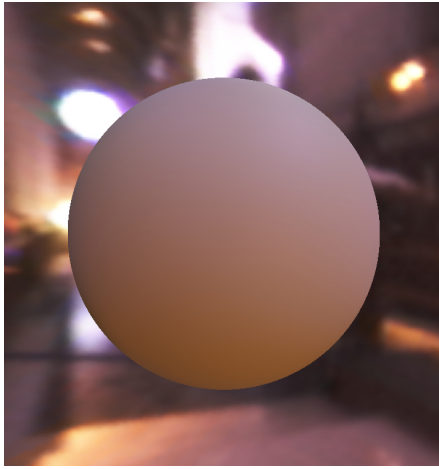


Fresnel term

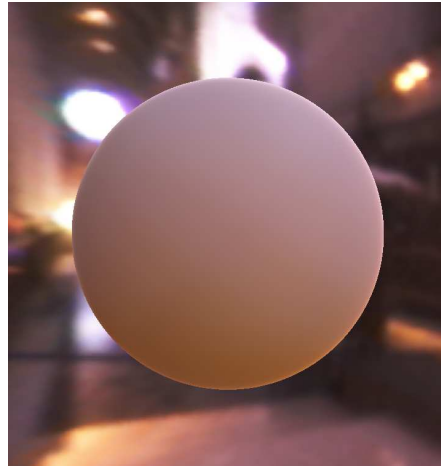


Material Name: *polyethylene*

Rendered Images



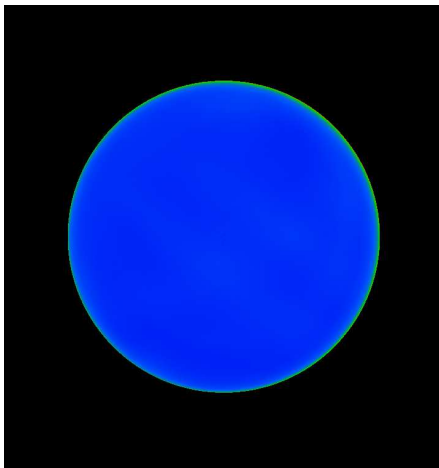
SGD



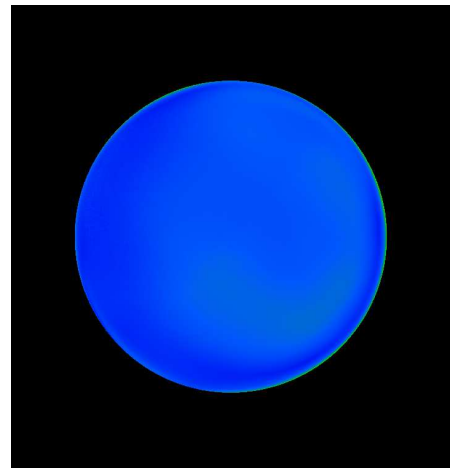
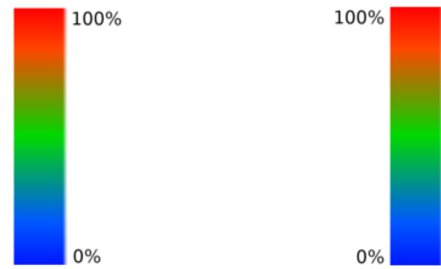
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

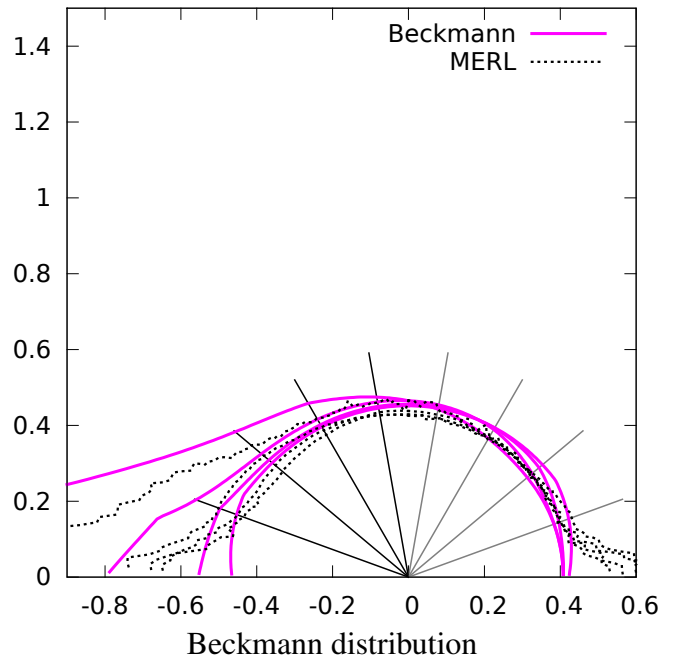
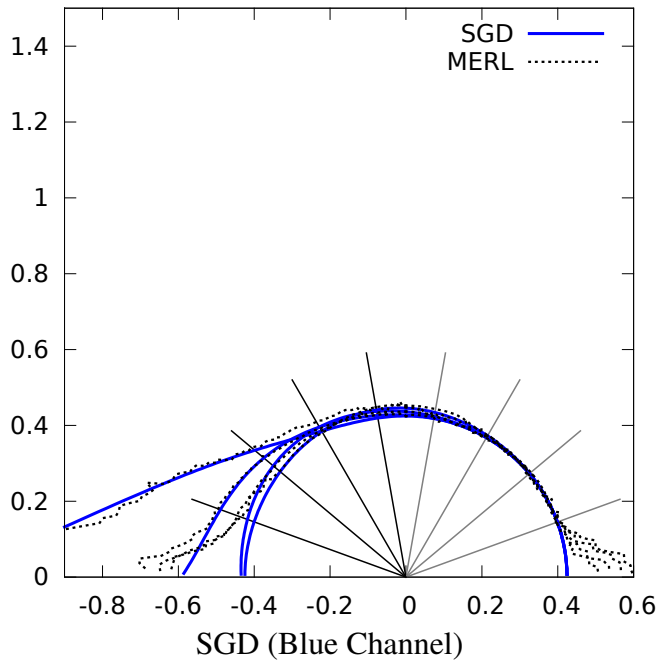
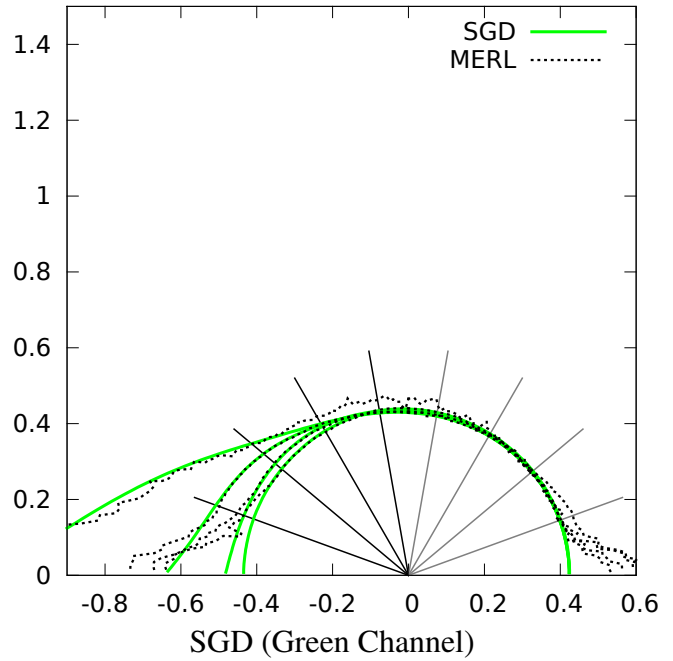
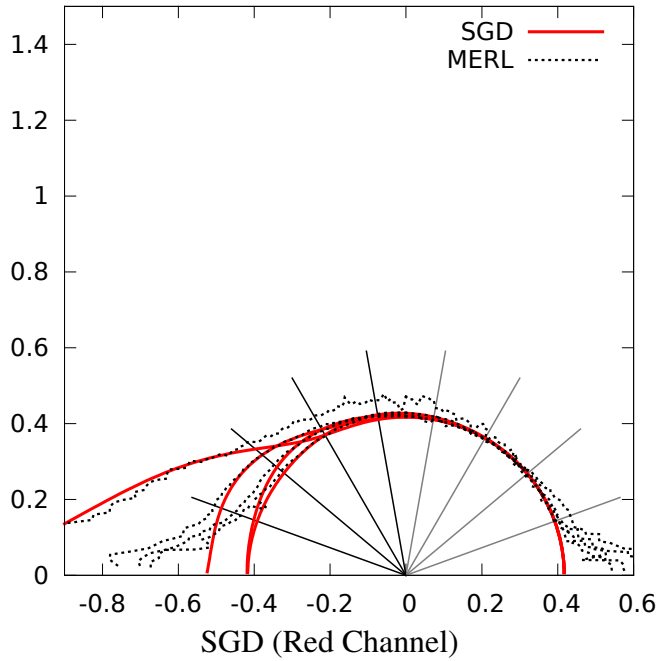
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.228049	0.0420869	0.0472725	2.09548e-13	0.489907	0.424297	22.178	0.00285999
Green	0.239339	0.134269	0.260465	0.743064	0.316434	0.244434	4.24558	0.00147486
Blue	0.240326	0.0867928	0.0719615	2.27838e-13	0.181688	0.0772152	14.9332	0.00191841

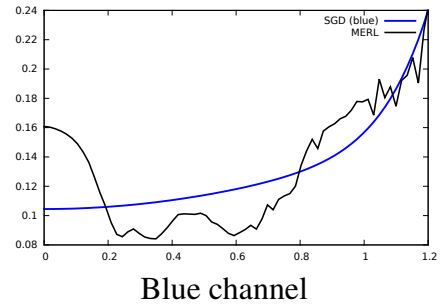
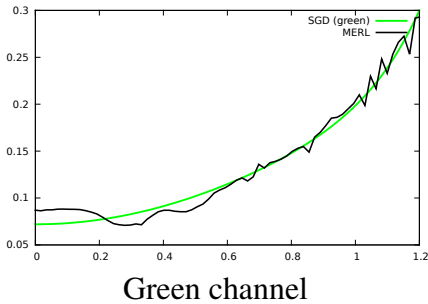
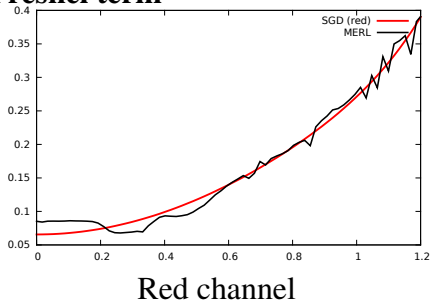
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.92064	0.330549	14.3439	0.61045
Green	4.37149	9.78063e-07	17.178	-0.470479
Blue	4.27422	0.109488	12.5991	0.517652

BRDF lobes in the incidence plane (Cubic root applied)

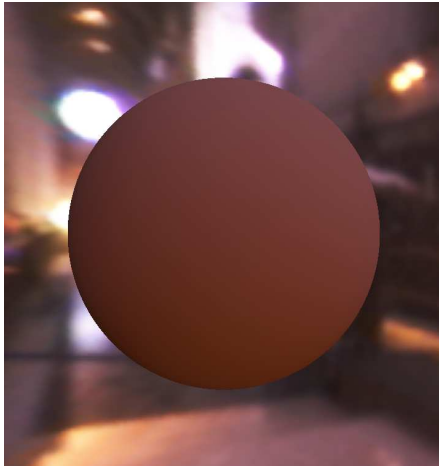


Fresnel term

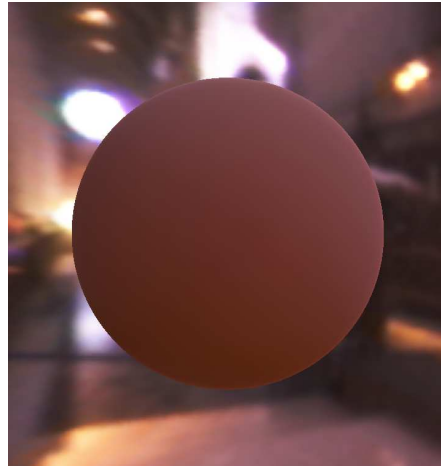


Material Name: *polyurethane-foam*

Rendered Images



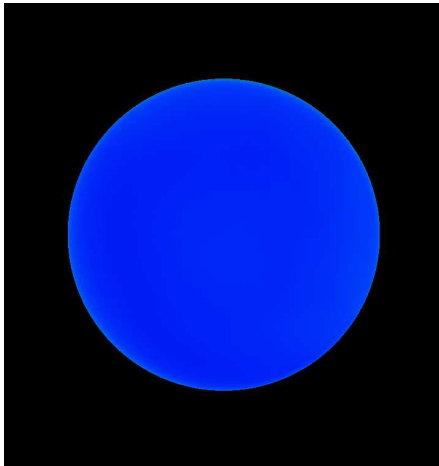
SGD



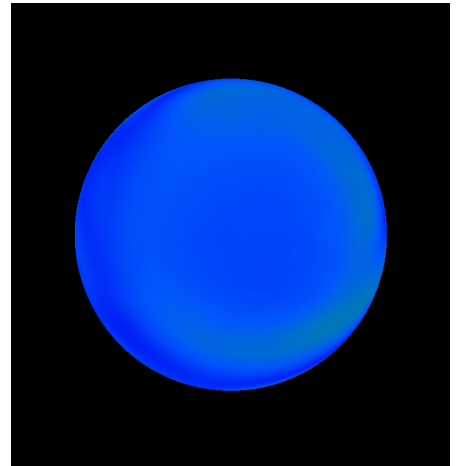
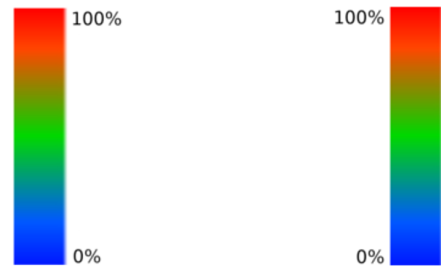
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

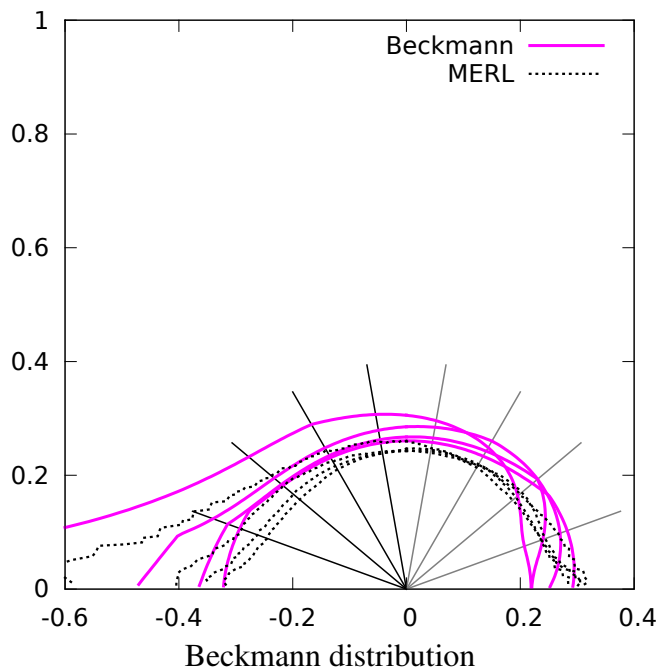
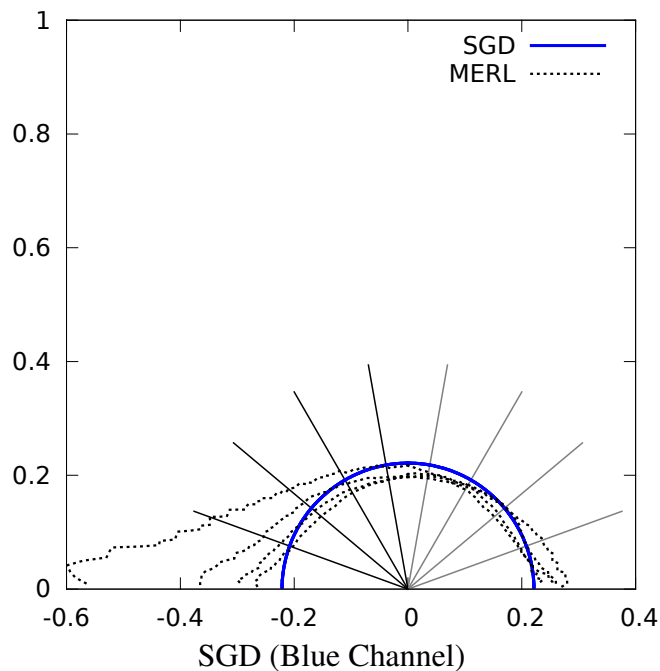
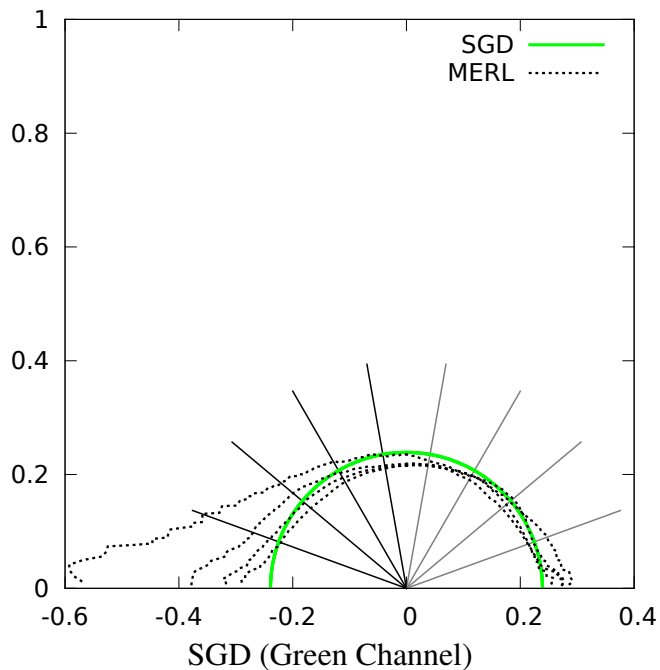
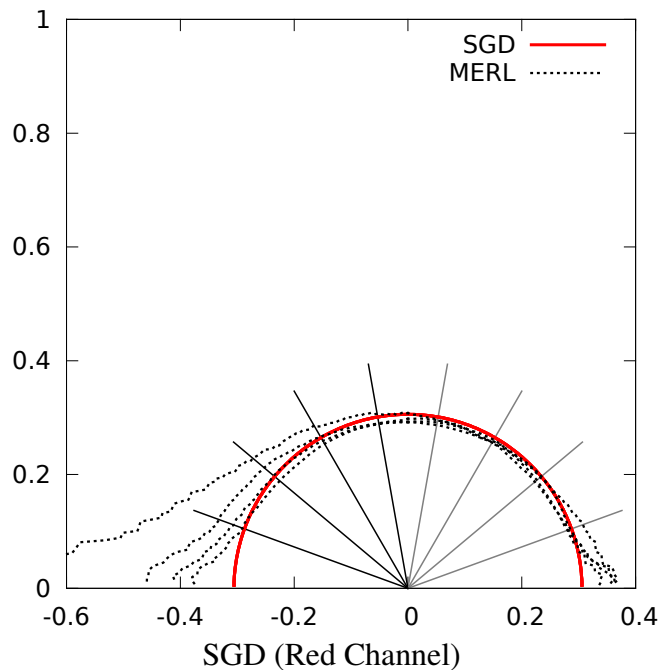
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0898318	4.0852e-12	0.154984	0.188586	1	0	7.18433	0.00119032
Green	0.0428583	8.0217e-14	0.142104	0.188095	1	0	7.70043	0.000823112
Blue	0.0340984	4.05682e-14	0.139418	0.188124	1	0	7.81983	0.000753708

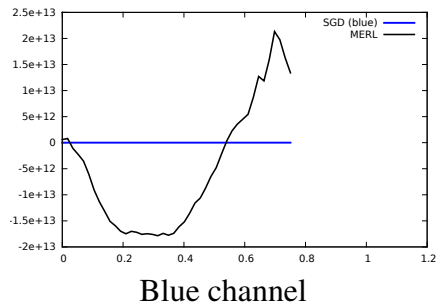
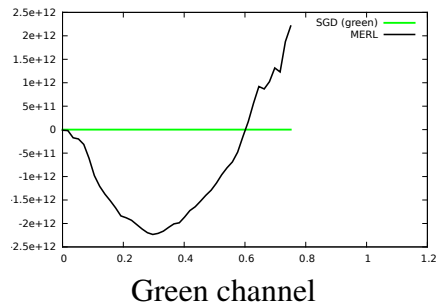
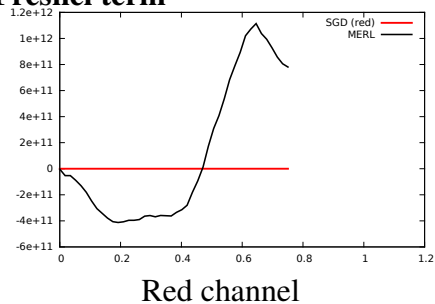
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.50087	0.0079259	11.6922	0.226848
Green	3.67779	0.00567317	12.3795	0.217315
Blue	3.7174	0.00525063	12.537	0.215132

BRDF lobes in the incidence plane (Cubic root applied)

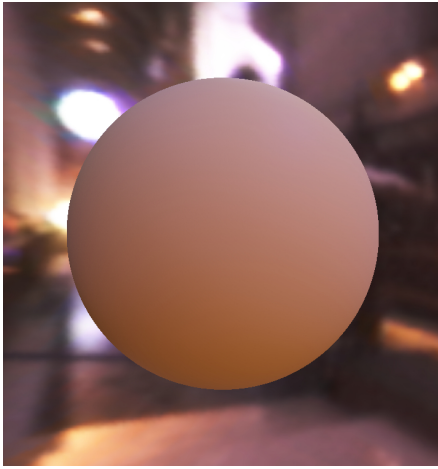


Fresnel term



Material Name: *pure-rubber*

Rendered Images



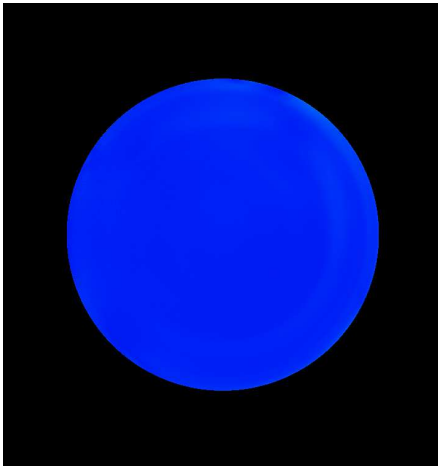
SGD



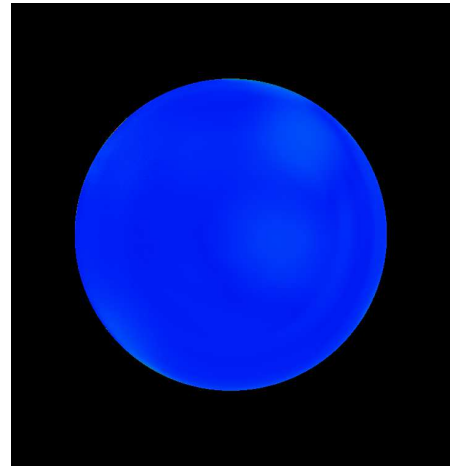
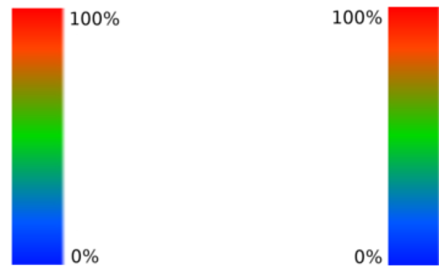
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

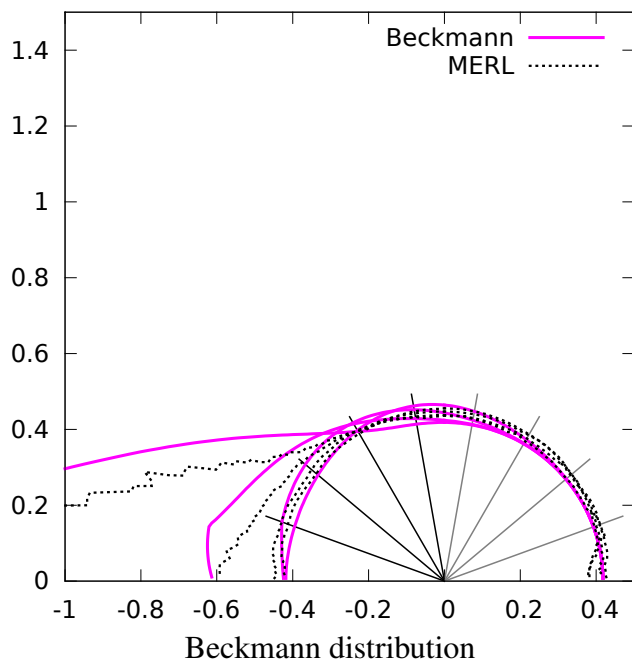
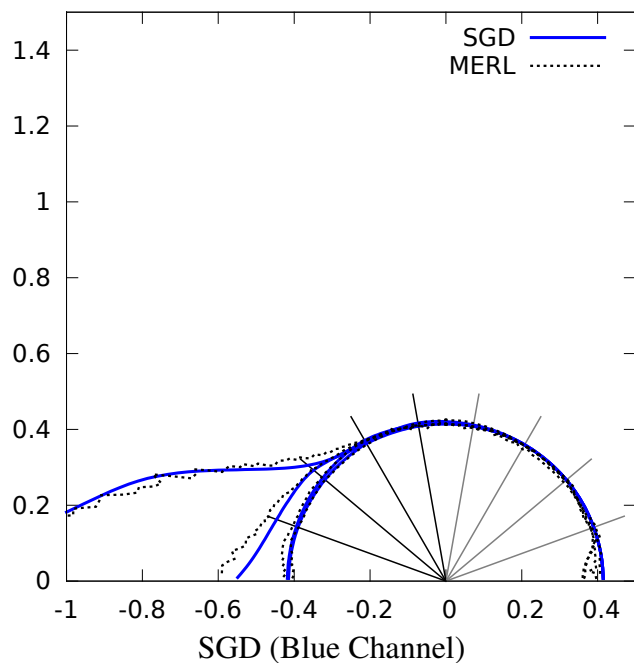
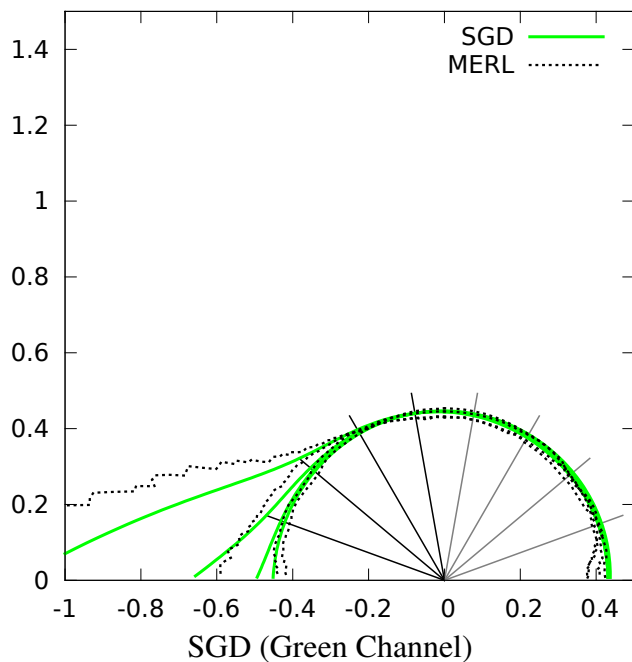
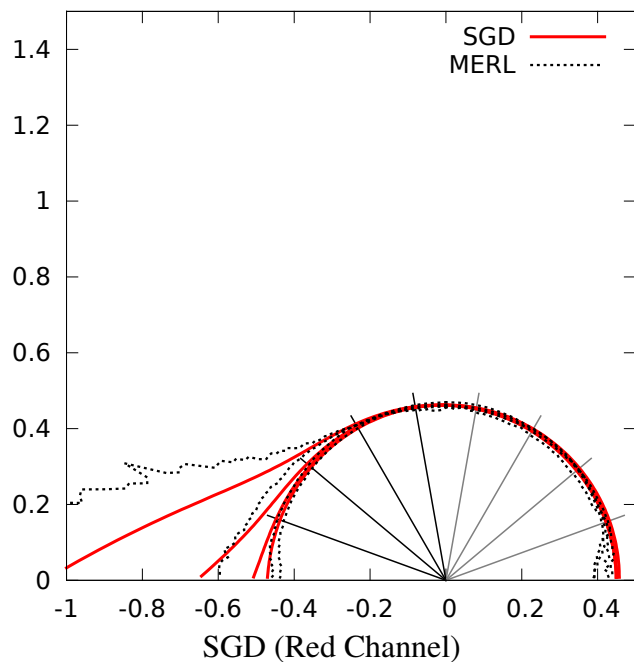
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.284259	0.542899	0.62899	1.13687	0.0185379	-0.0265343	3.75577	0.00177602
Green	0.251873	0.598765	0.41413	0.452063	0.00420901	-0.035723	3.75969	0.00171837
Blue	0.223824	0.142162	0.0693873	0.262952	0.0353132	0.0236736	13.6137	0.0007762

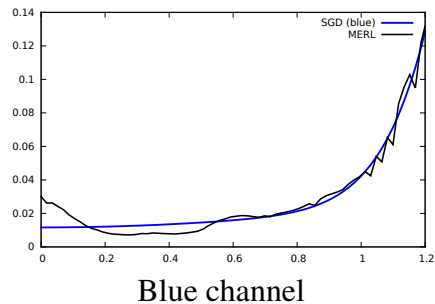
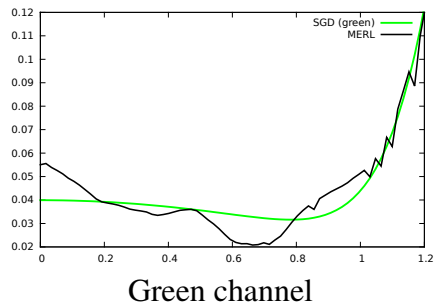
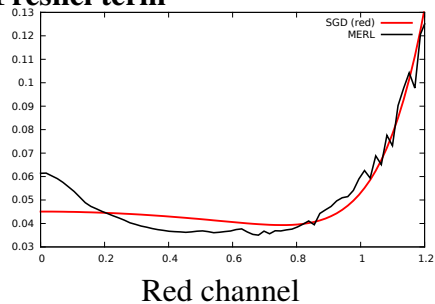
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.17187	0.0311422	7.14885	0.152489
Green	2.13584	0.0526357	7.0586	0.245615
Blue	5.56595	7.8942e-07	23.9264	-0.0979145

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *purple-paint*

Rendered Images



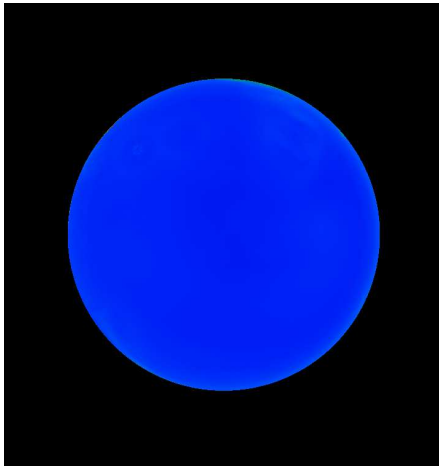
SGD



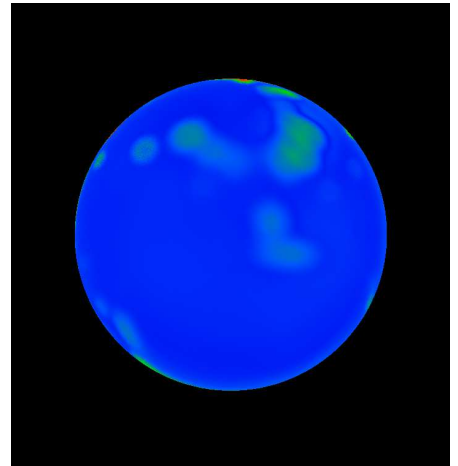
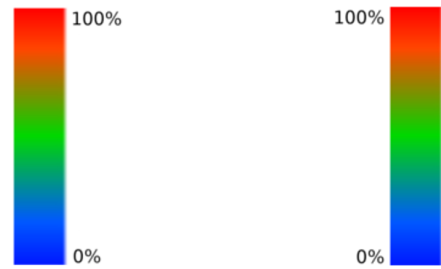
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

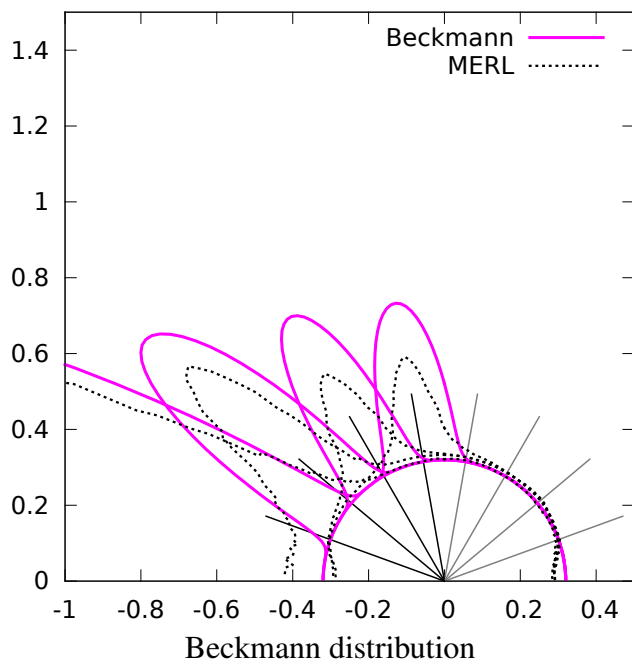
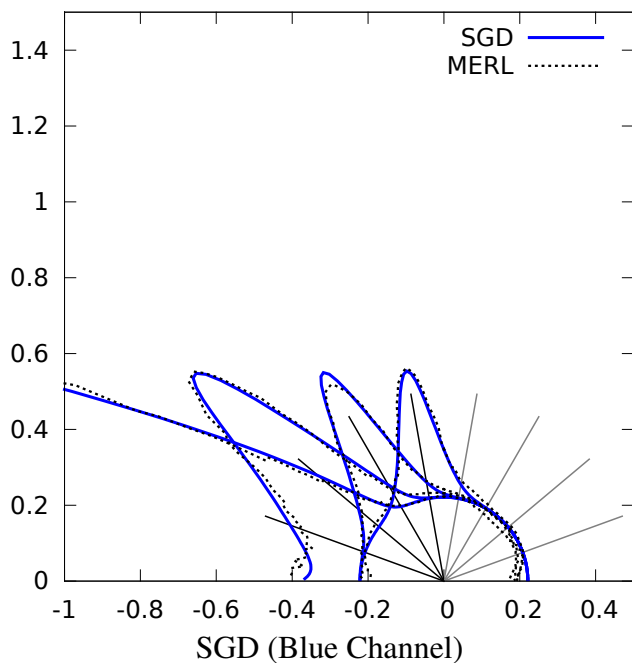
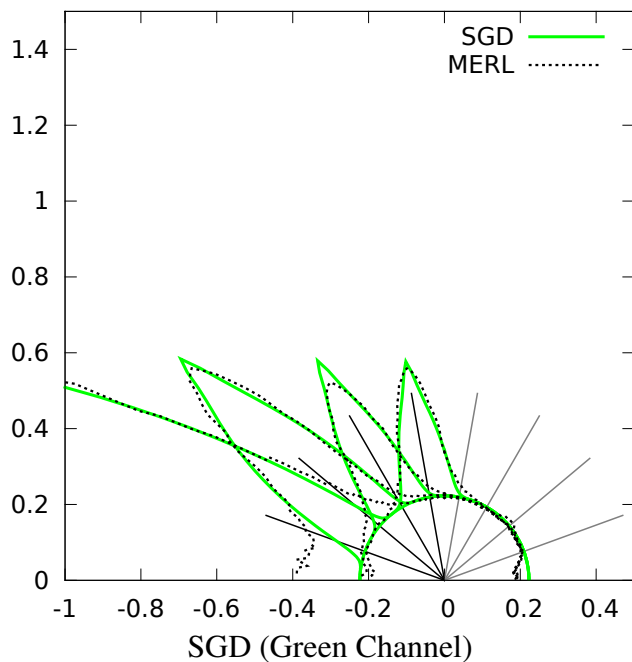
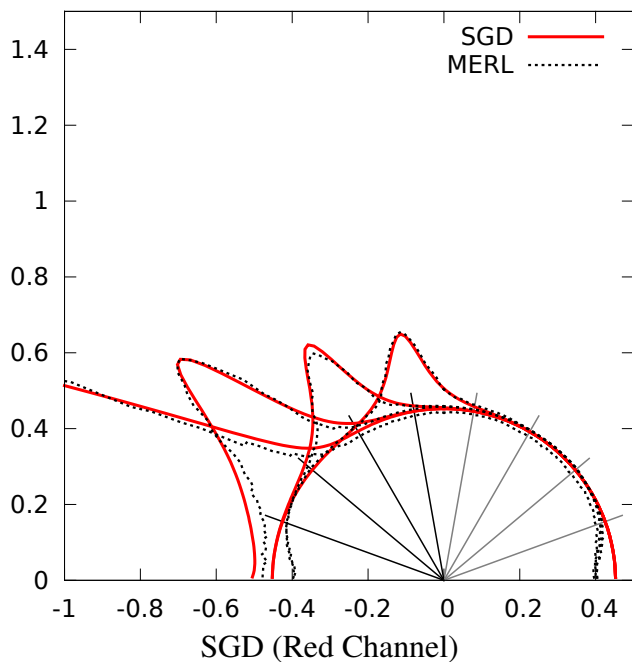
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.290743	0.301308	0.0339173	0.703279	0.0654958	0.0299494	16.3705	0.00296394
Green	0.0347118	0.205258	0.00839425	0.20083	0.0786512	0.0467651	104.698	0.00277256
Blue	0.0339802	0.280717	0.0378011	0.797376	0.0696424	0.0373649	13.2101	0.00225685

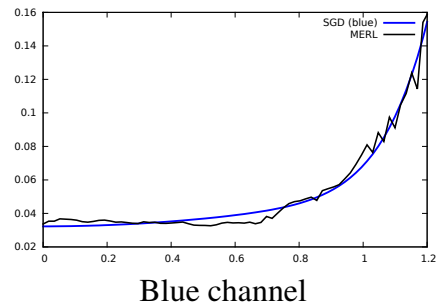
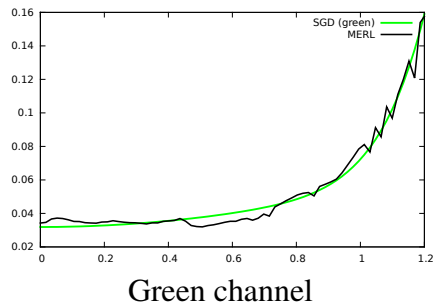
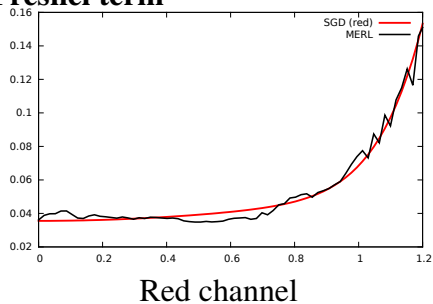
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.72814	1.10548e-07	38.0847	0.0789738
Green	6.77684	0.177314	41.1712	0.576929
Blue	1.54679	6.66798e-08	38.2781	0.0587144

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *pvc*

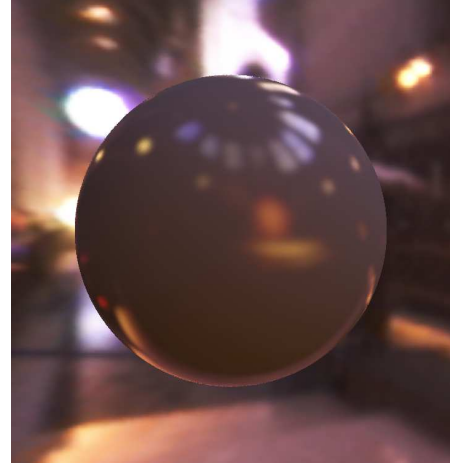
Rendered Images



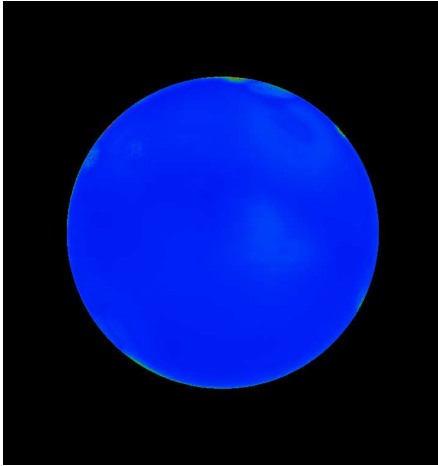
SGD



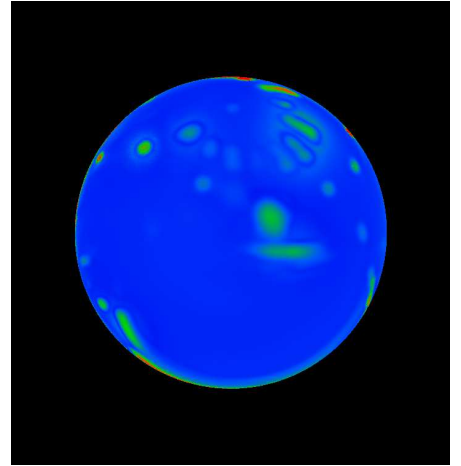
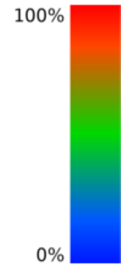
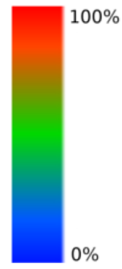
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

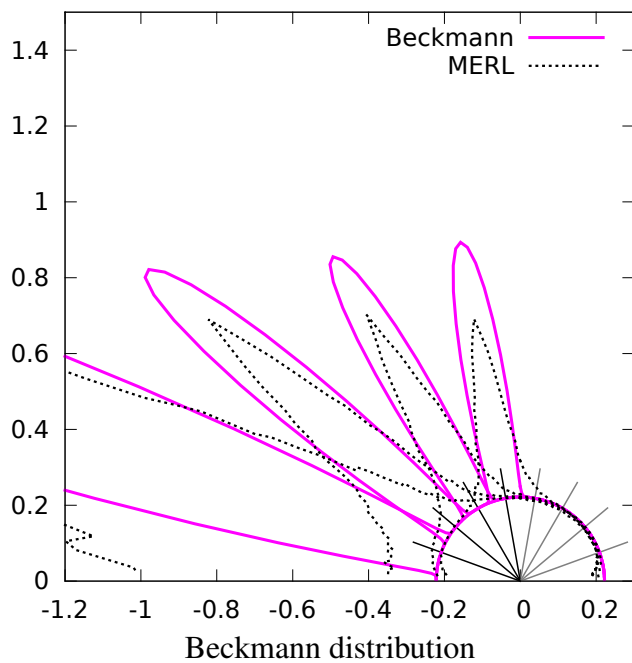
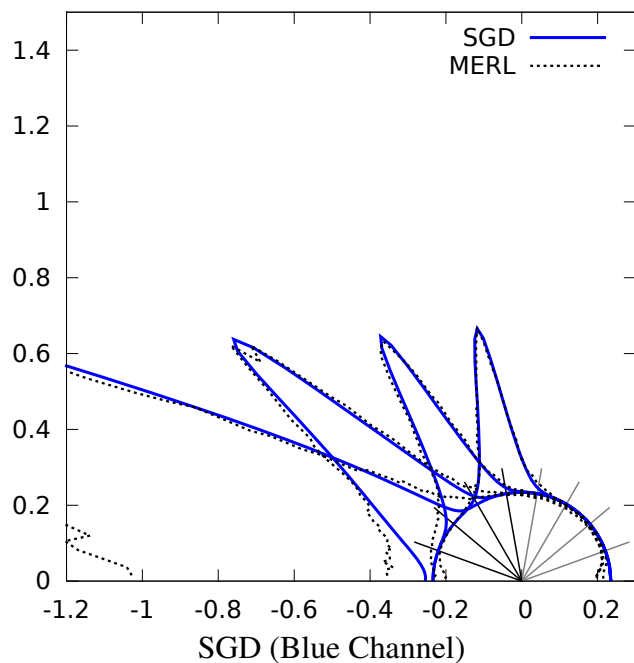
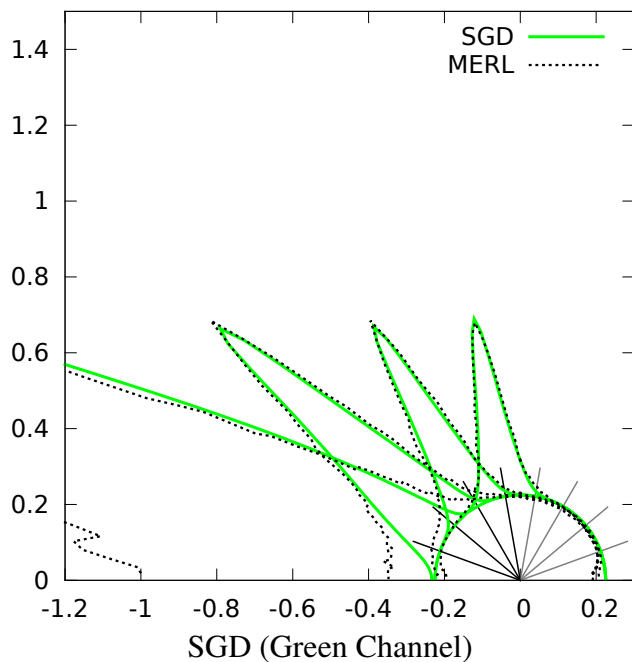
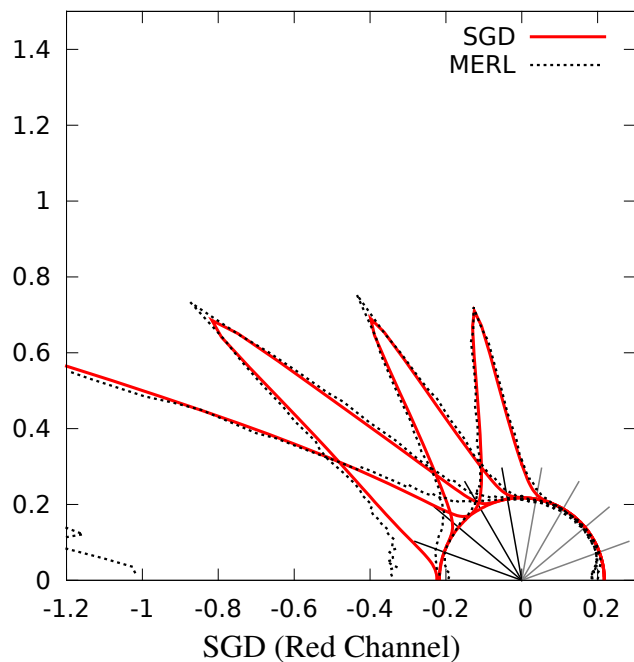
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0322978	0.28767	0.0171547	0.769726	0.0289552	0.00815373	25.8231	0.00471012
Green	0.0357449	0.317369	0.0176681	0.730637	0.026258	0.00651989	26.9026	0.00620207
Blue	0.0403426	0.310067	0.0213663	0.797555	0.0281305	0.00714485	20.5927	0.00575443

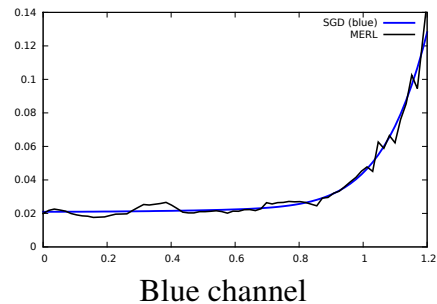
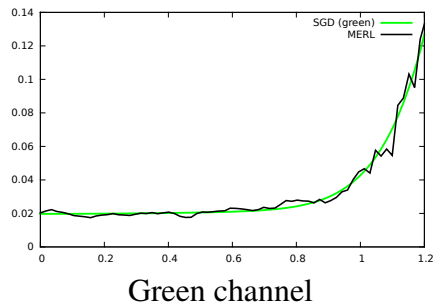
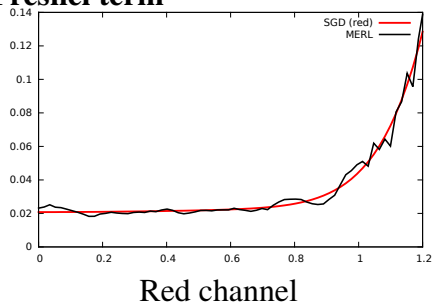
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.20095	1.02768e-07	51.5975	0.218049
Green	1.31883	1.09767e-07	50.0184	0.208814
Blue	1.23655	5.97648e-08	48.1953	0.173894

BRDF lobes in the incidence plane (Cubic root applied)

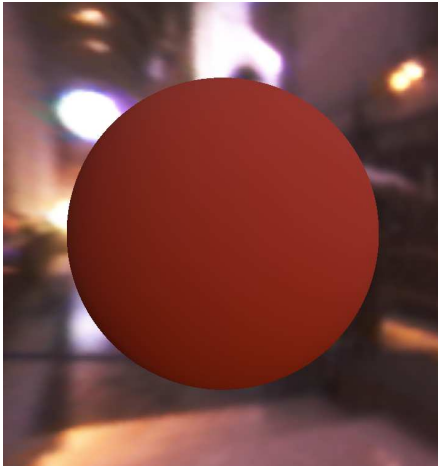


Fresnel term



Material Name: *red-fabric2*

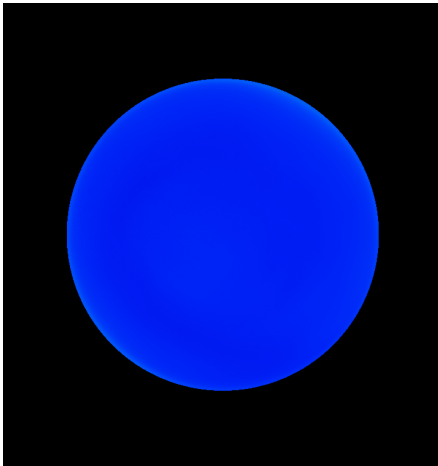
Rendered Images



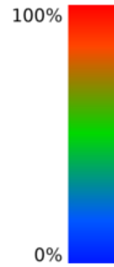
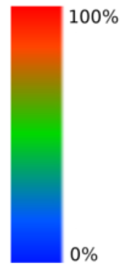
SGD



Reference



SGD (Lab difference)



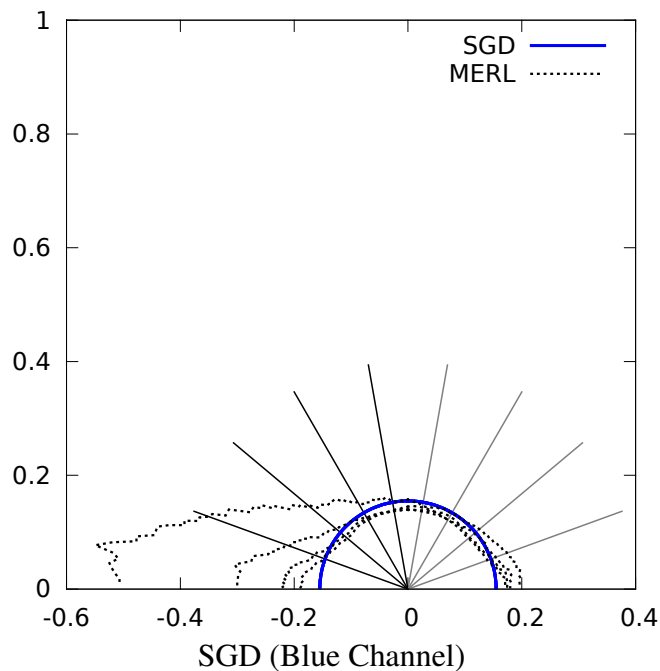
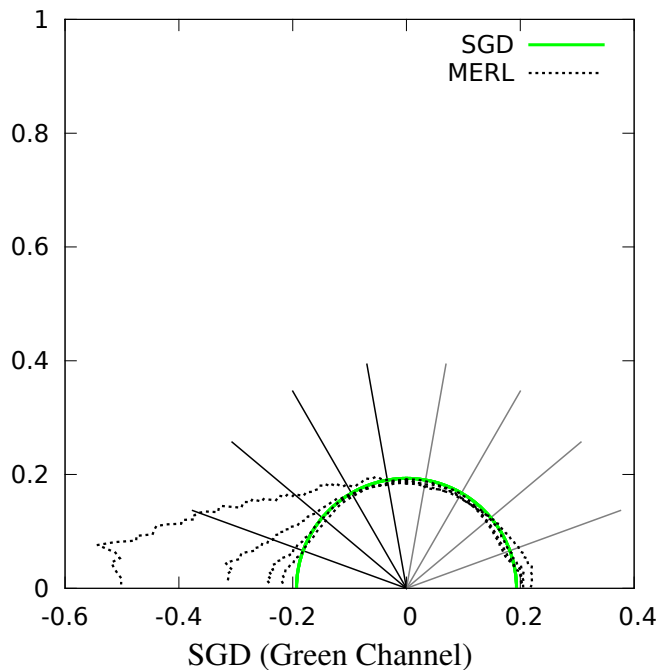
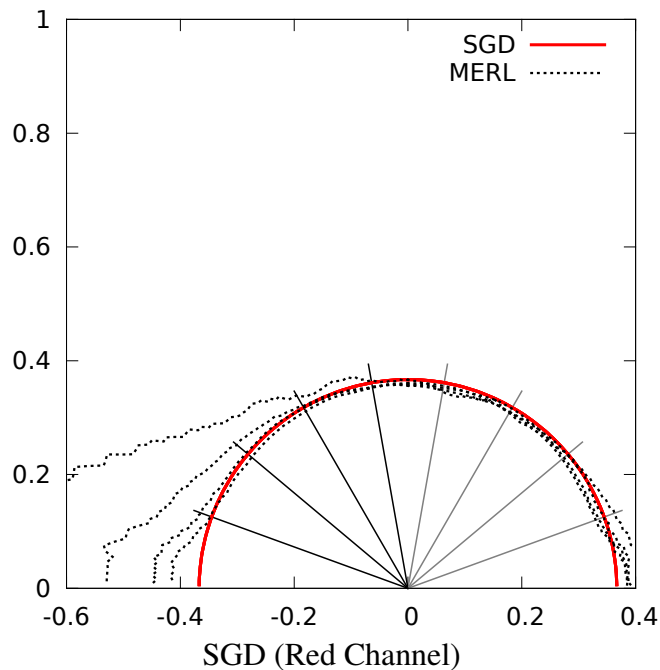
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.155216	1.80657e-15	0.16689	0.184631	1	0	6.78759	0.00263226
Green	0.0226757	5.51946e-13	0.135884	0.18856	1	0	7.98303	0.00060129
Blue	0.0116884	1.35221e-15	0.128307	0.1883	1	0	8.36701	0.000538747

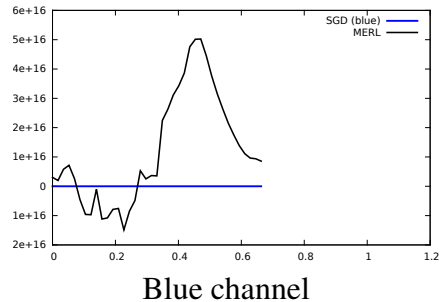
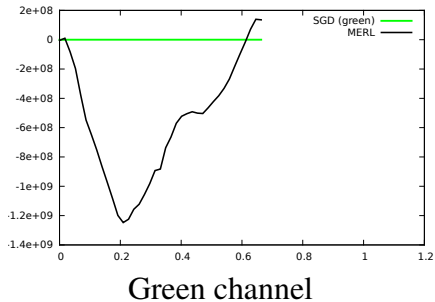
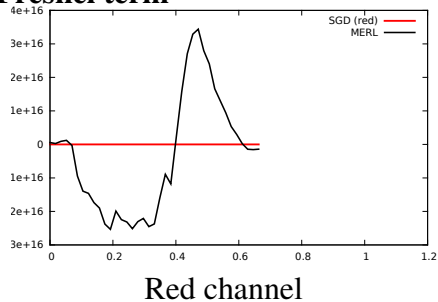
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.33819	0.0112096	11.0557	0.240935
Green	3.77225	0.00468671	12.7596	0.21164
Blue	3.89063	0.00372538	13.2393	0.206003

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

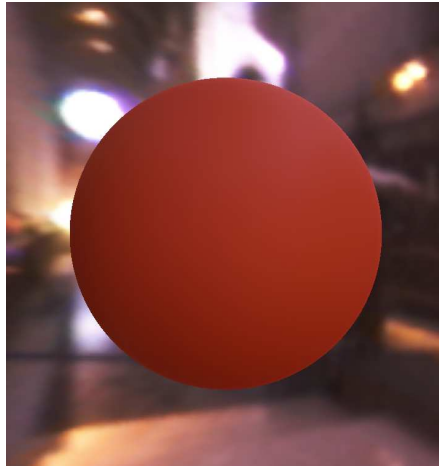


Material Name: *red-fabric*

Rendered Images



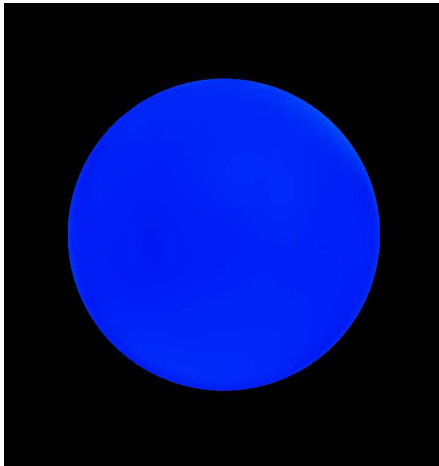
SGD



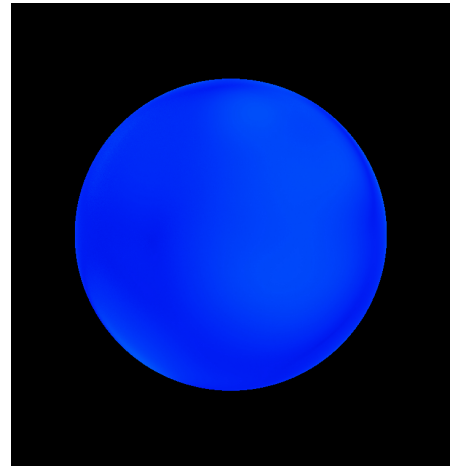
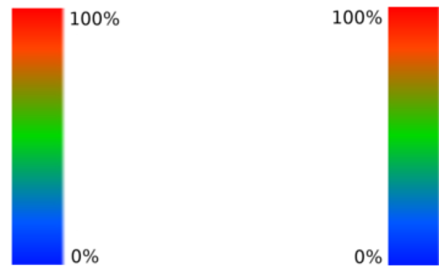
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

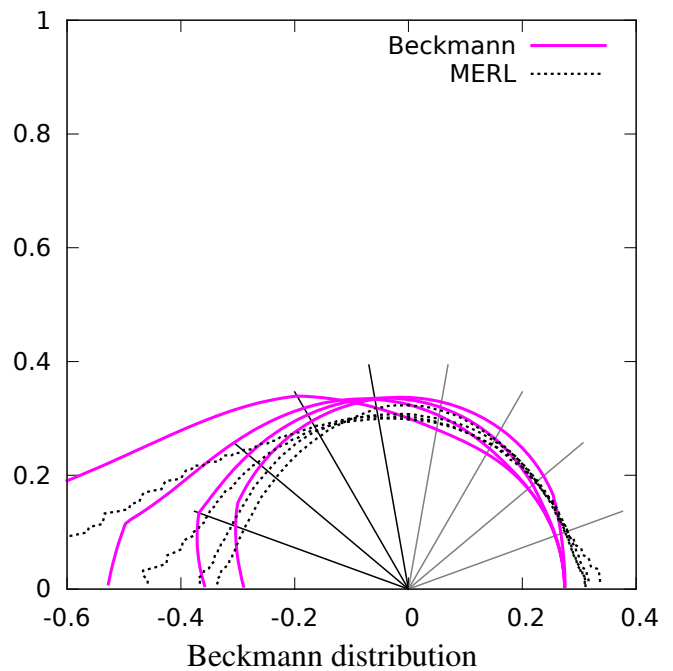
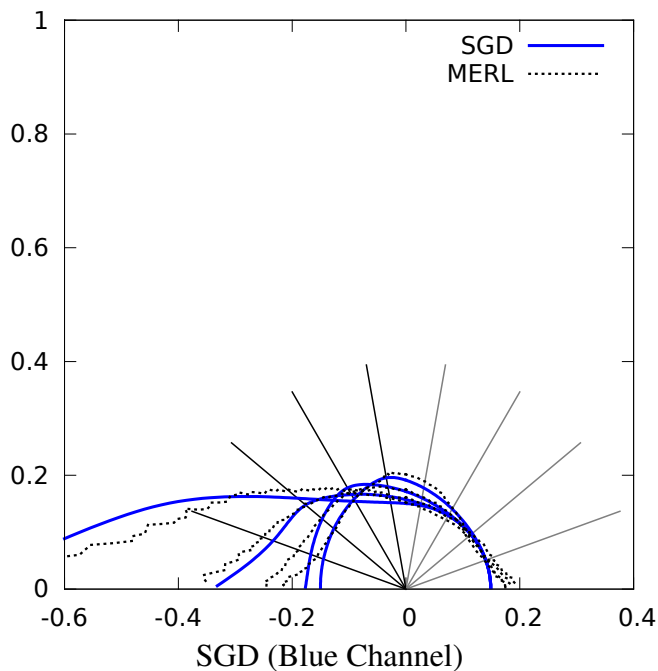
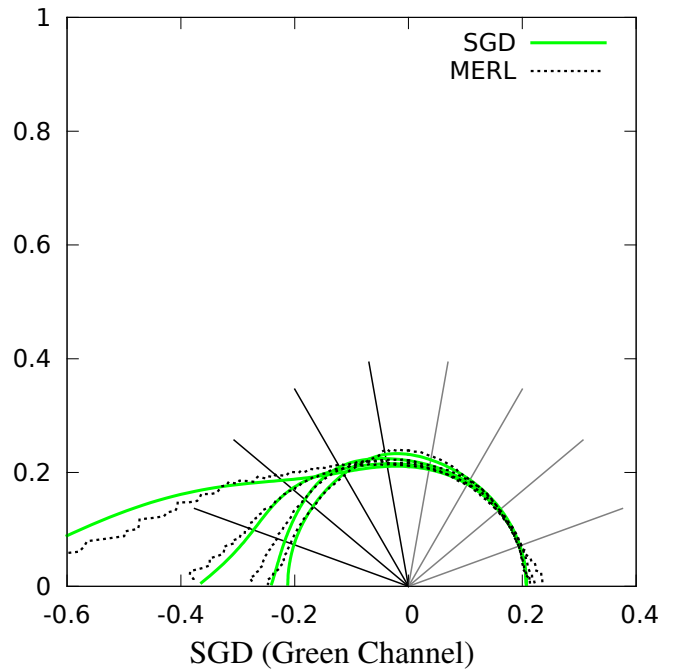
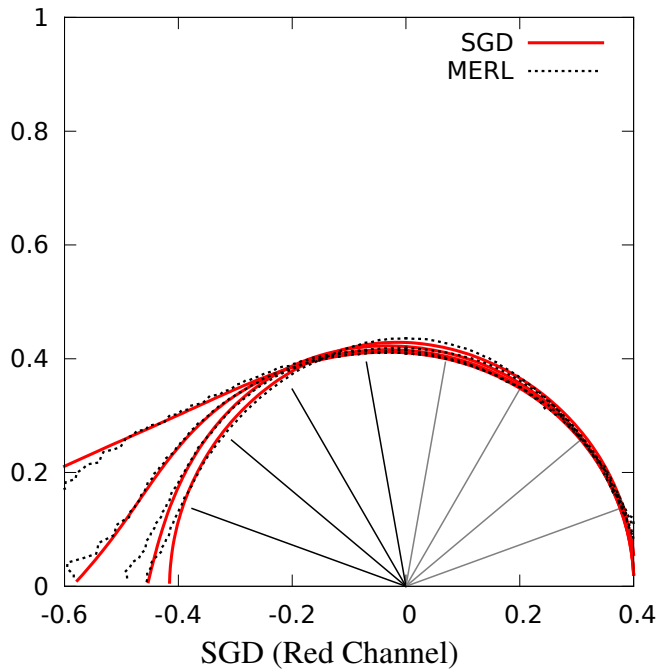
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.201899	0.168669	0.324447	0.787411	0.0718348	-0.0585917	3.88129	0.00103676
Green	0.0279008	0.0486346	0.228455	0.821197	0.0644687	-0.0062547	4.32067	0.000248481
Blue	0.0103965	0.040485	0.109436	0.279212	0.0206123	-0.050402	9.16355	0.000220698

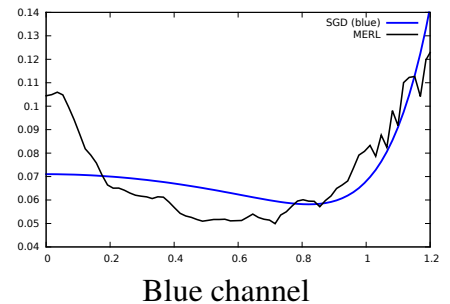
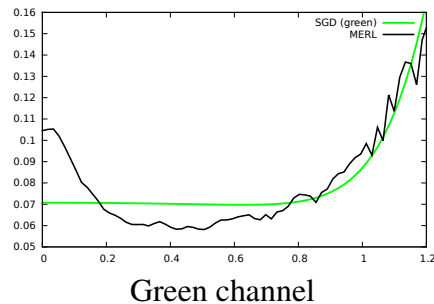
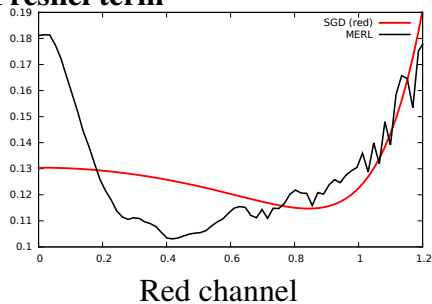
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.59825	0.000130047	13.0776	-0.209387
Green	3.93046	1.04152e-07	19.649	-0.530789
Blue	4.66379	4.59182e-05	17.8852	-0.0242035

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

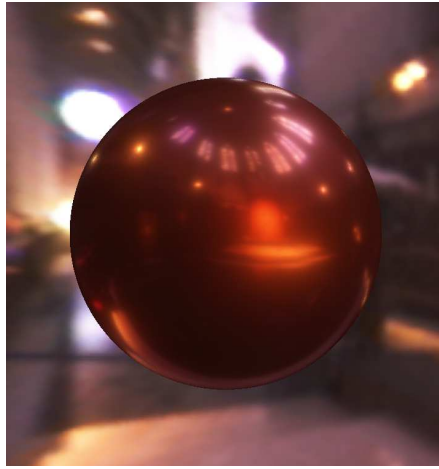


Material Name: *red-metallic-paint*

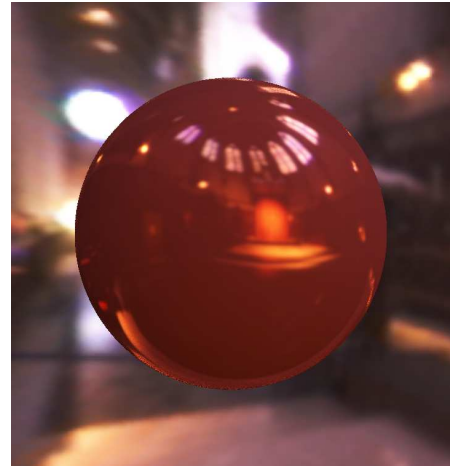
Rendered Images



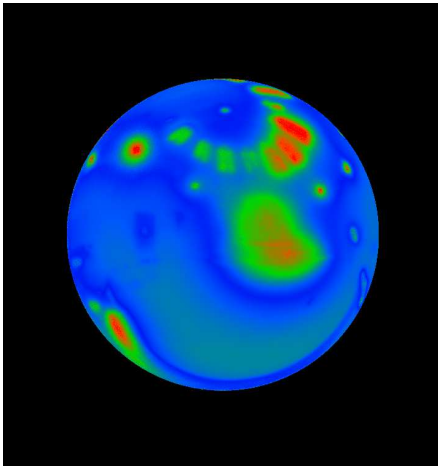
SGD



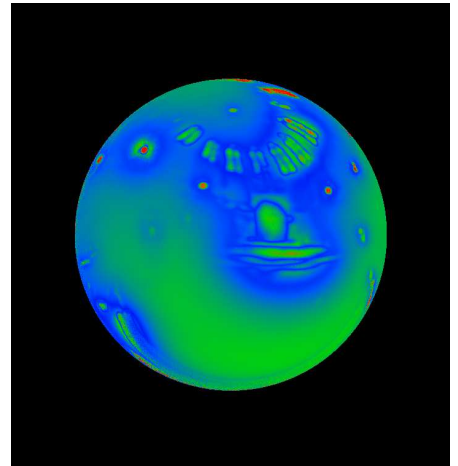
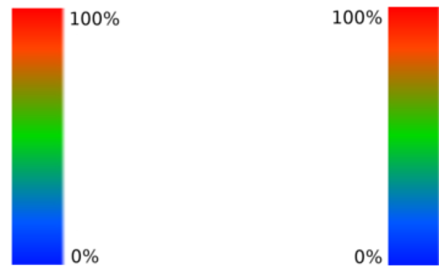
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

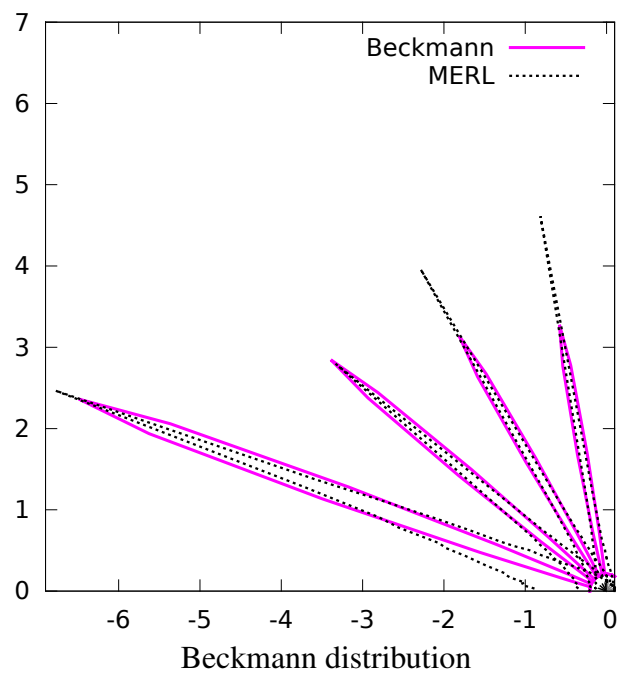
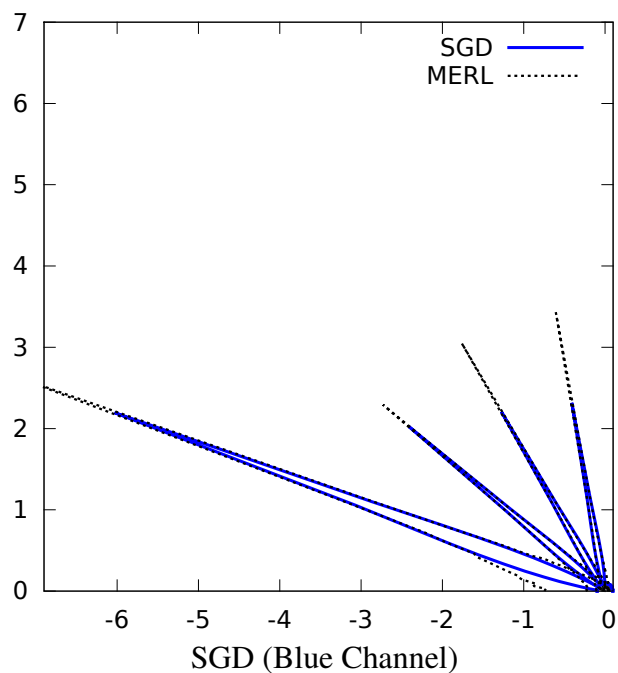
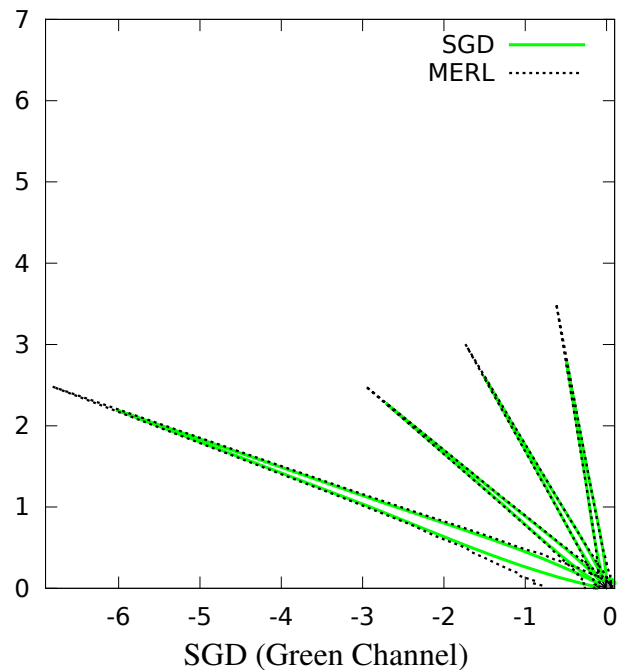
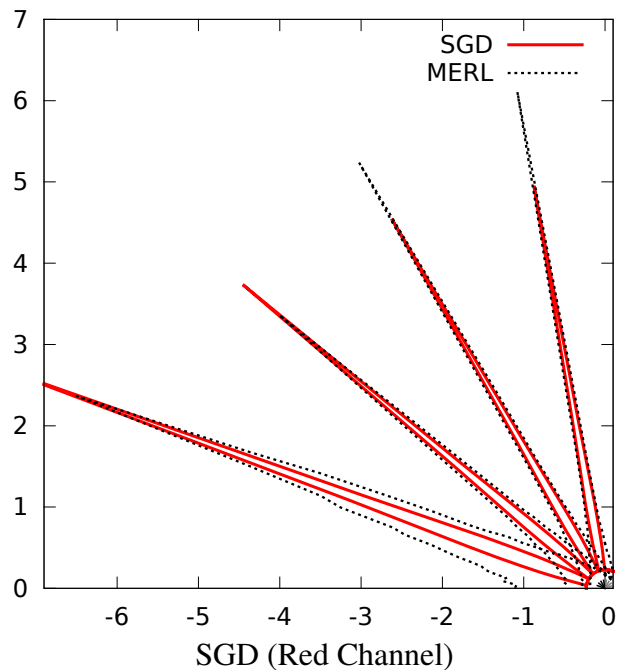
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0380897	0.0416724	0.00133258	0.693854	2.45718e-16	-1	300.371	0.287672
Green	0.00540095	0.07642	0.00106883	0.52857	0.0598671	-0.08904	521.418	0.0467824
Blue	0.00281156	0.108438	0.00128863	0.539477	0.0633332	-0.0114056	425.982	0.0286558

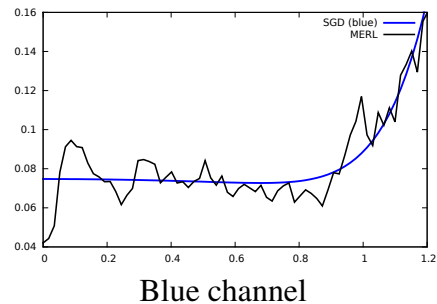
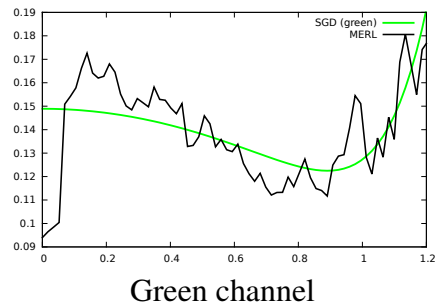
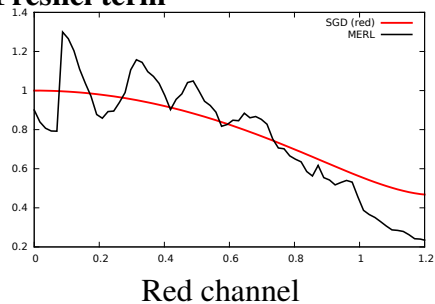
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.45857e-05	2.75773e-07	33.0213	-0.121415
Green	6.3446e-07	4.05125e-07	24.3646	-0.469753
Blue	8.51754e-07	3.41703e-07	23.5793	-0.532083

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *red-phenolic*

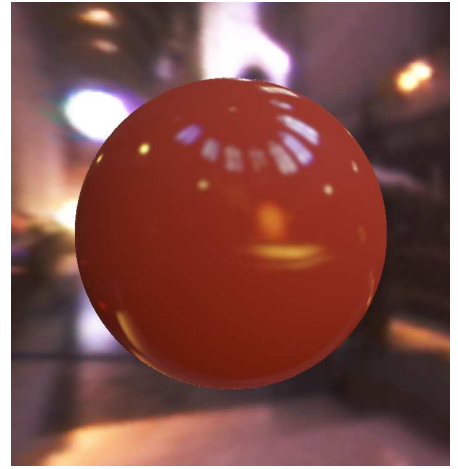
Rendered Images



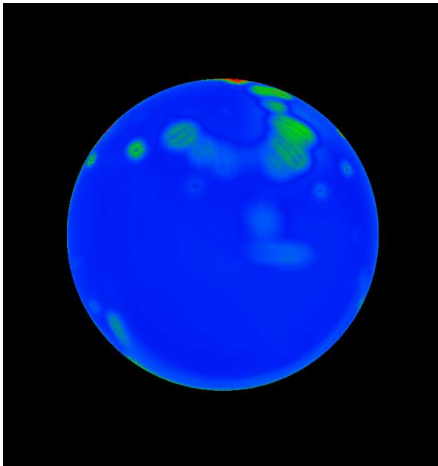
SGD



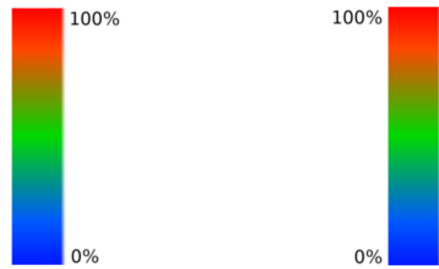
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

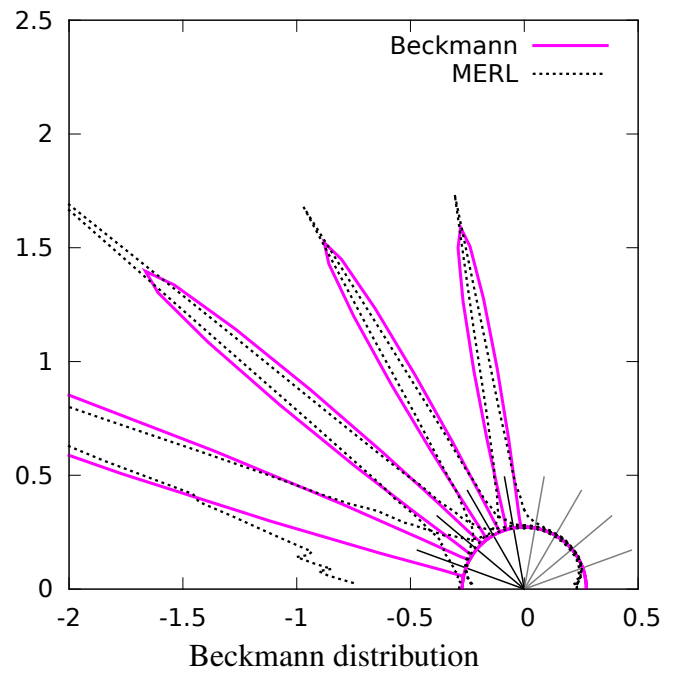
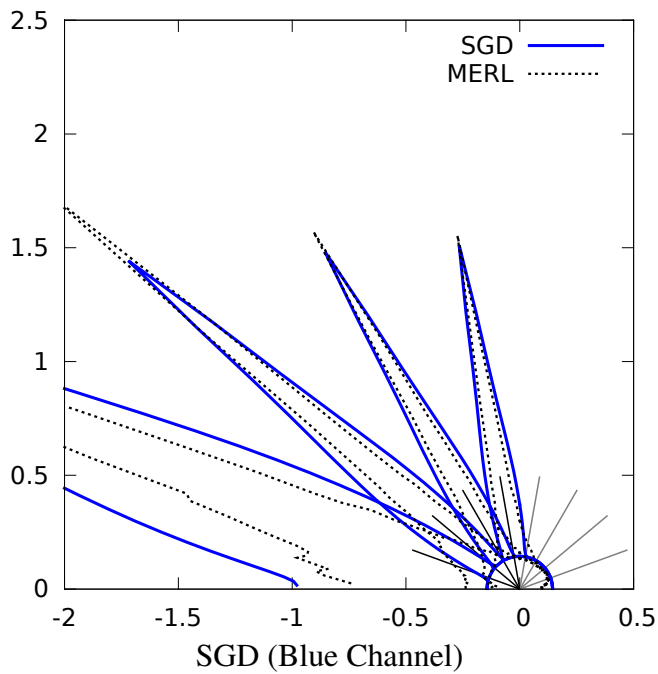
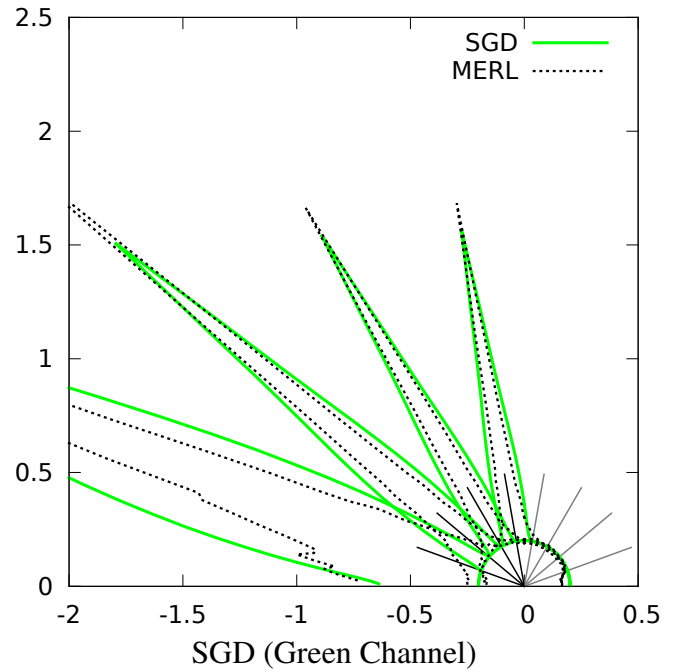
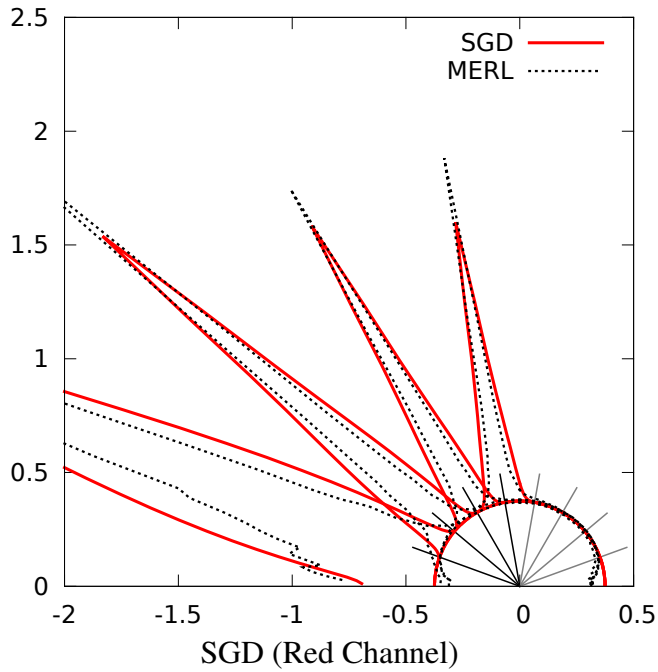
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.165227	0.240561	0.0052844	0.568938	0.156419	0.0752589	104.336	0.0680783
Green	0.0256259	0.360634	0.00467439	0.509763	0.0972193	0.0444558	128.839	0.0859239
Blue	0.00935644	0.475777	0.00613717	0.575762	0.069671	0.0266428	89.6357	0.0936197

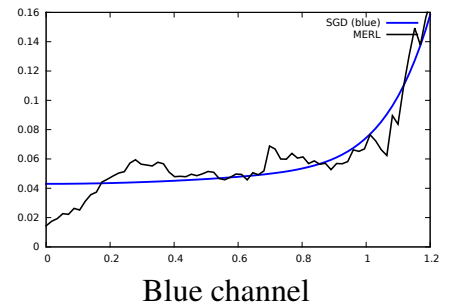
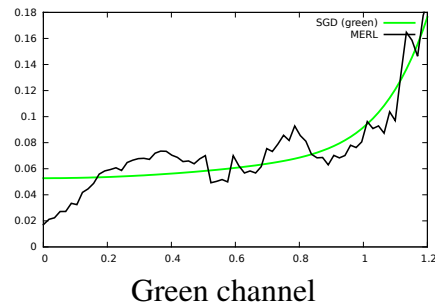
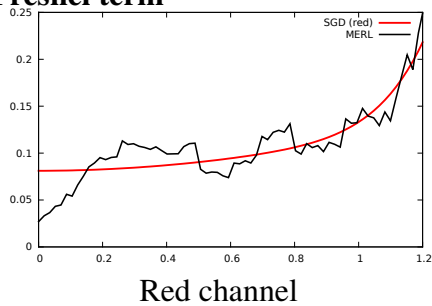
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.57629	6.38793e-08	77.4088	0.343482
Green	1.92067	6.71457e-08	79.3795	0.352913
Blue	1.57462	5.25172e-08	73.0158	0.324912

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

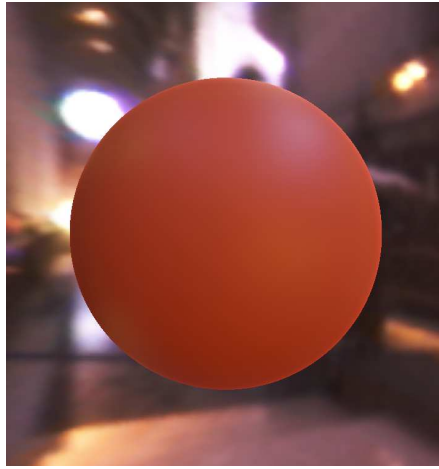


Material Name: *red-plastic*

Rendered Images



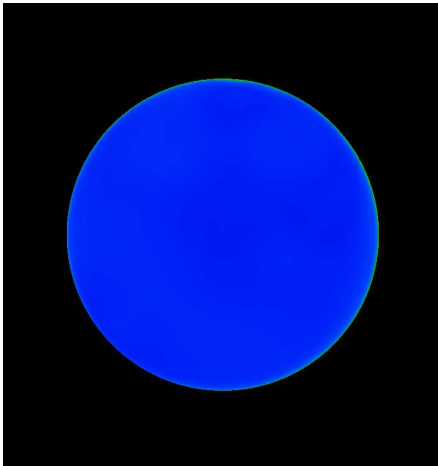
SGD



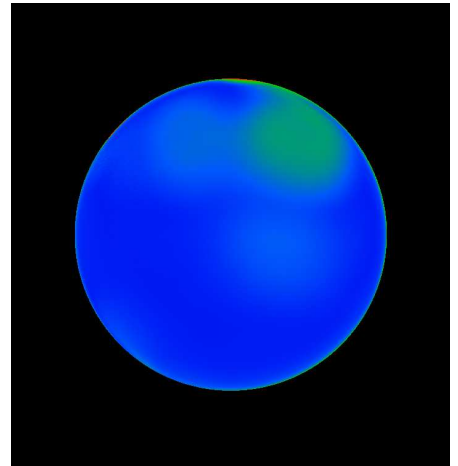
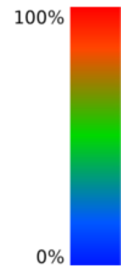
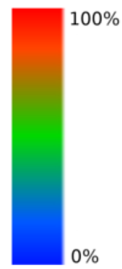
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

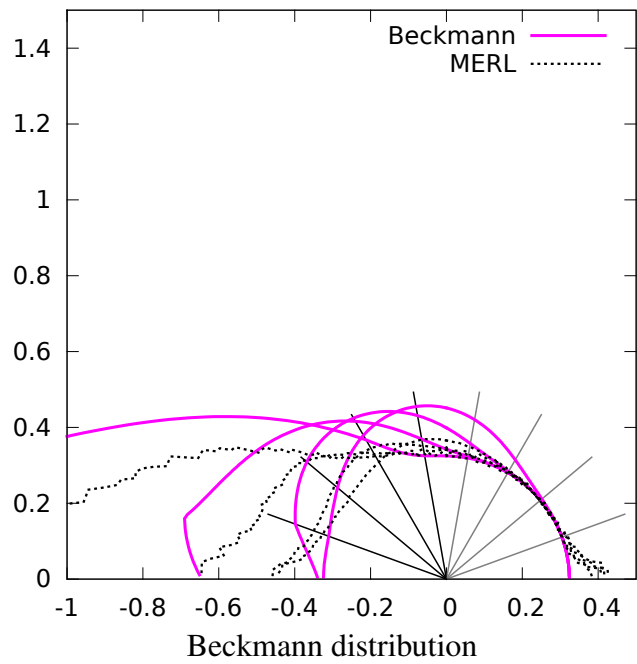
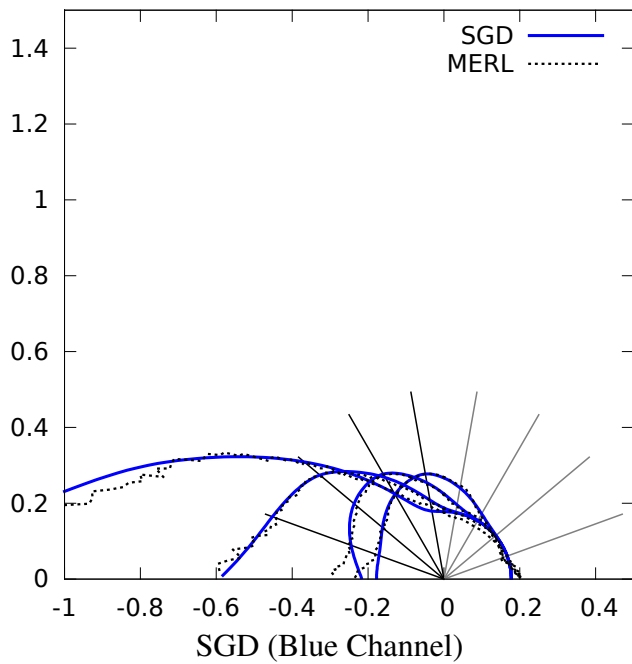
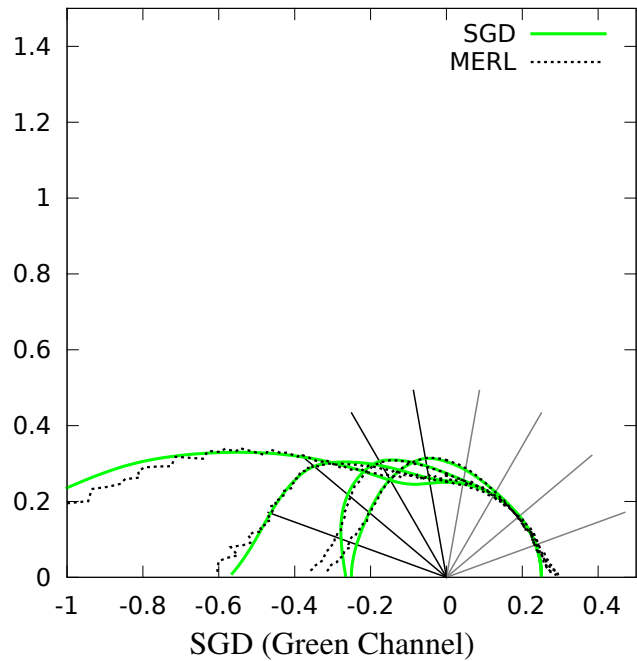
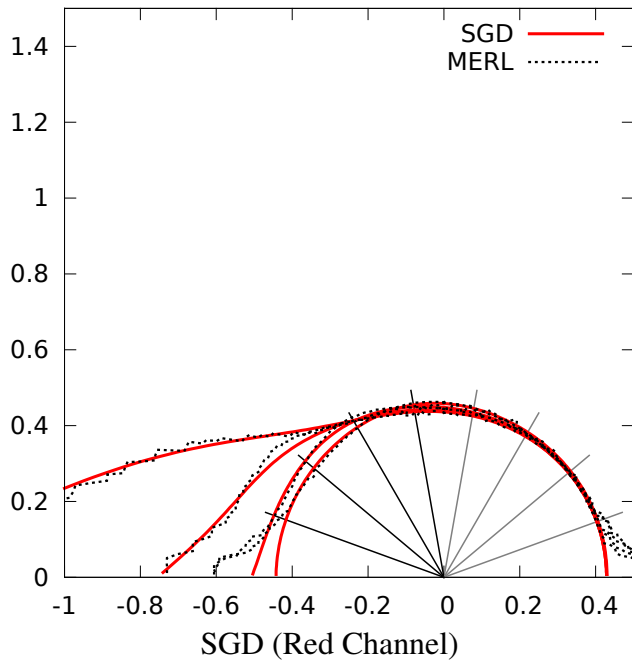
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.247569	0.406976	0.28723	0.939617	0.10036	0.0512697	3.80564	0.00134715
Green	0.049382	0.151478	0.0572489	0.0851973	0.178468	0.13191	17.8374	0.000536577
Blue	0.0175621	0.176348	0.0624682	0.0701483	0.149441	0.102958	16.5631	0.00047104

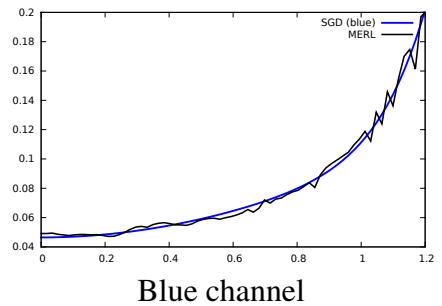
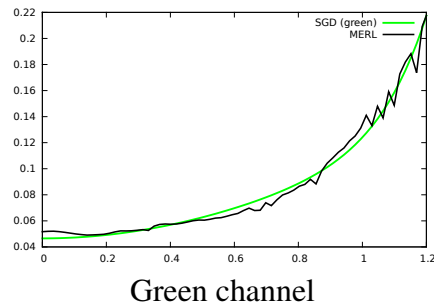
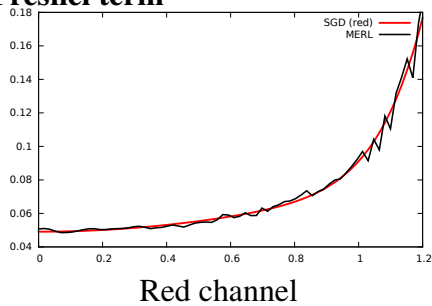
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.37031	1.03822e-07	18.6088	-0.609047
Green	4.96092	0.0236845	16.1371	0.43547
Blue	4.75924	0.0321546	15.1243	0.445882

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *red-specular-plastic*

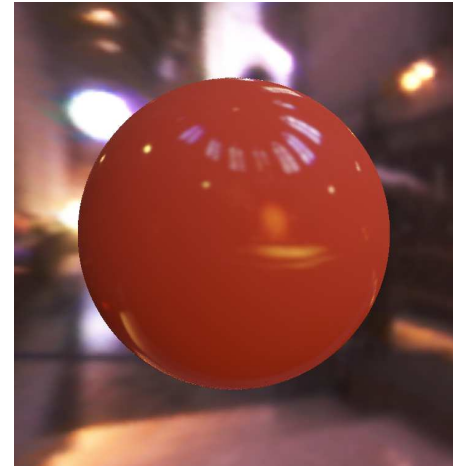
Rendered Images



SGD



Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

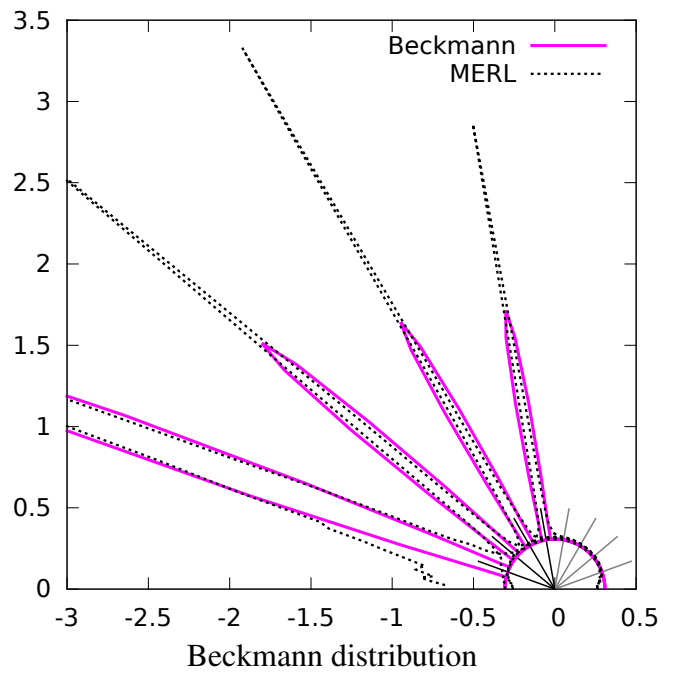
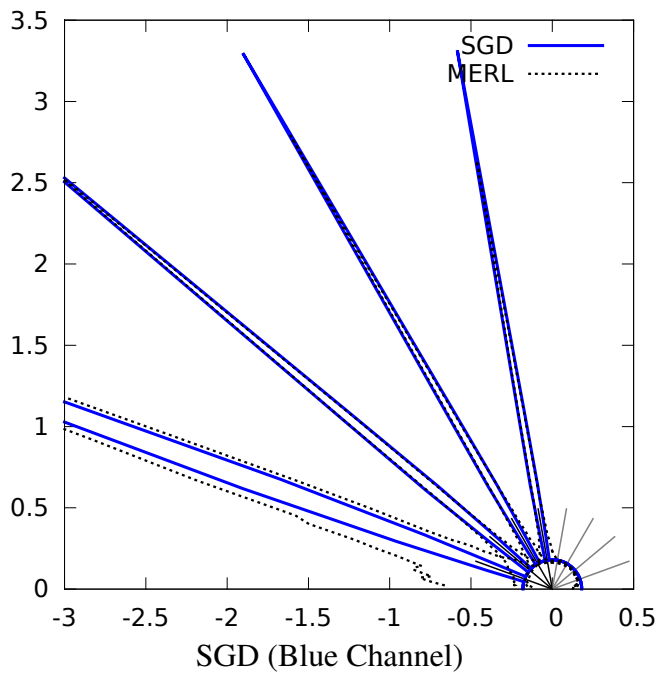
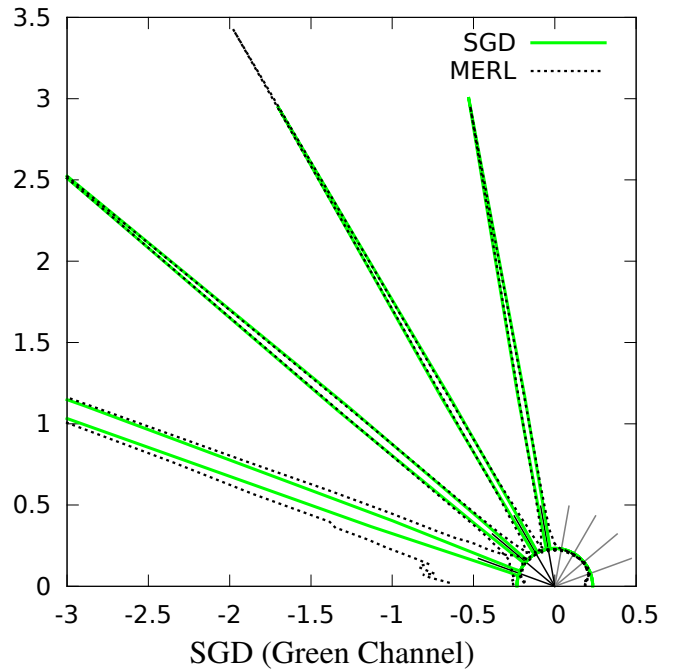
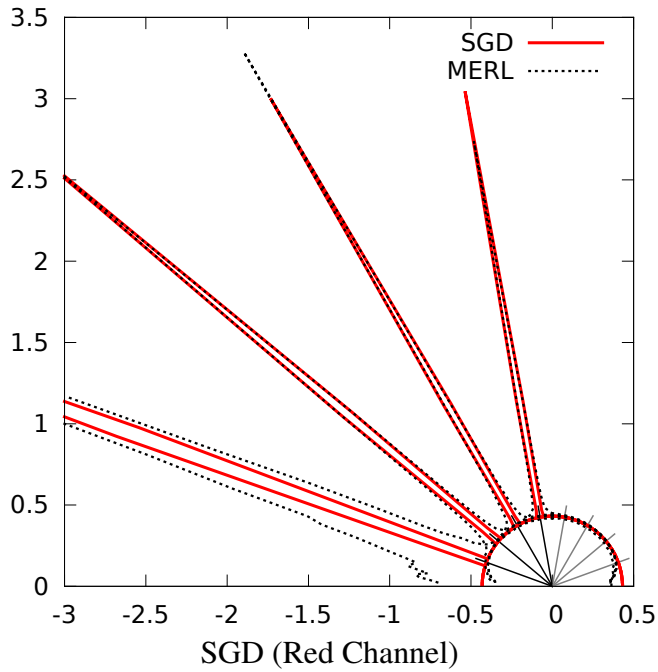
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.252589	0.0139957	6.01746e-05	0.174569	0.441328	0.191312	14623.1	0.0620224
Green	0.0397665	0.0343278	8.07327e-05	0.202455	0.179378	0.0691835	10620.2	0.0541448
Blue	0.0185317	0.0527973	0.000205705	0.390522	0.150221	0.0760833	3332.98	0.0836154

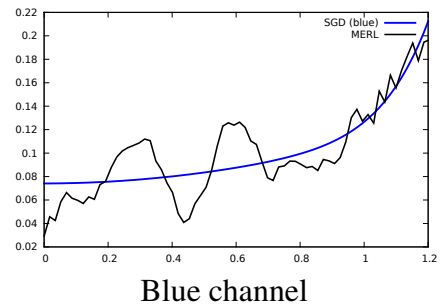
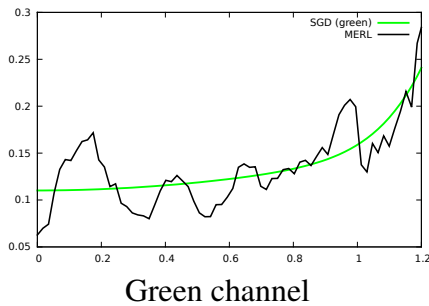
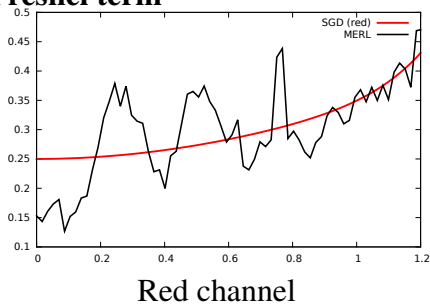
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	22.6631	1.37878e+79	187.799	1.19812
Green	12.9299	1.08829e+69	162.245	1.20136
Blue	3.06408	6.36761e-08	315.067	0.52102

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

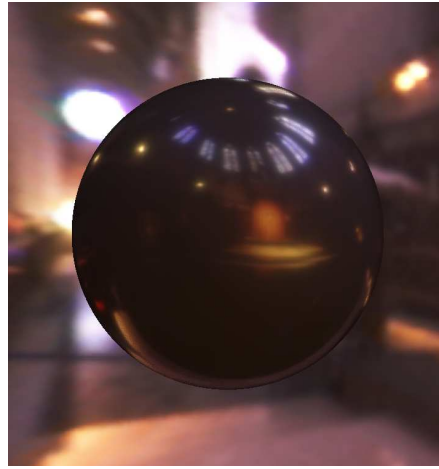


Material Name: *silicon-nitride*

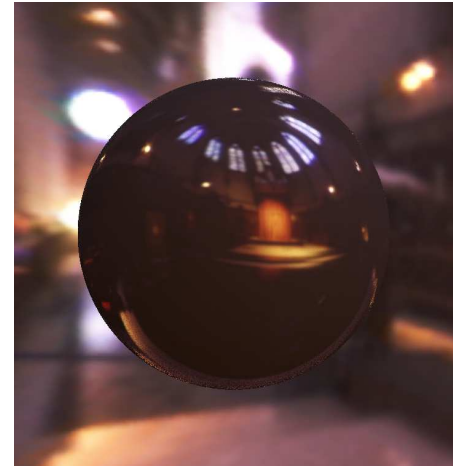
Rendered Images



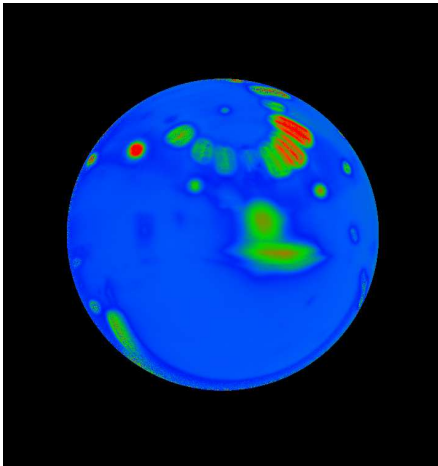
SGD



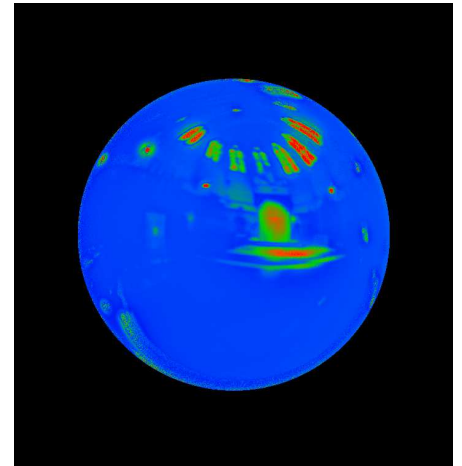
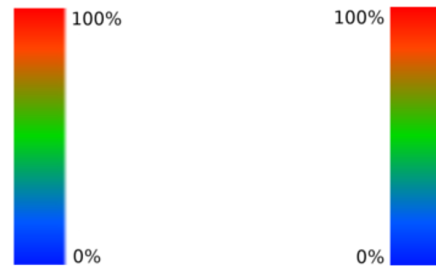
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

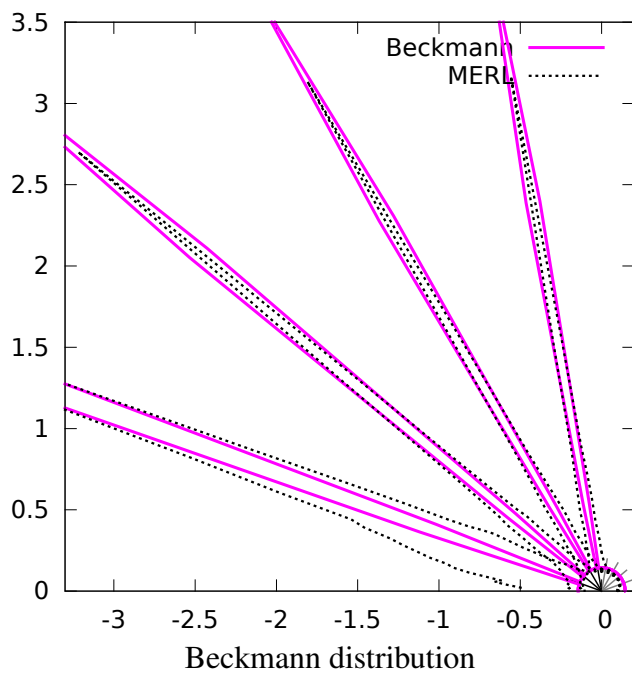
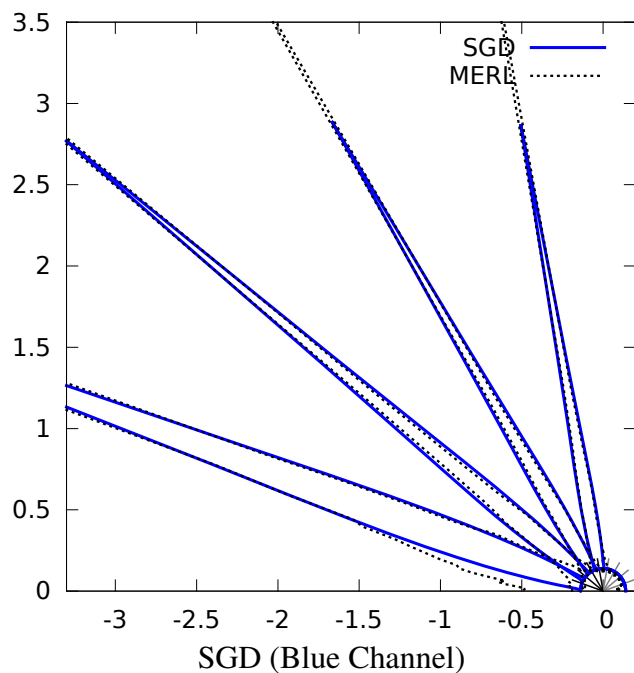
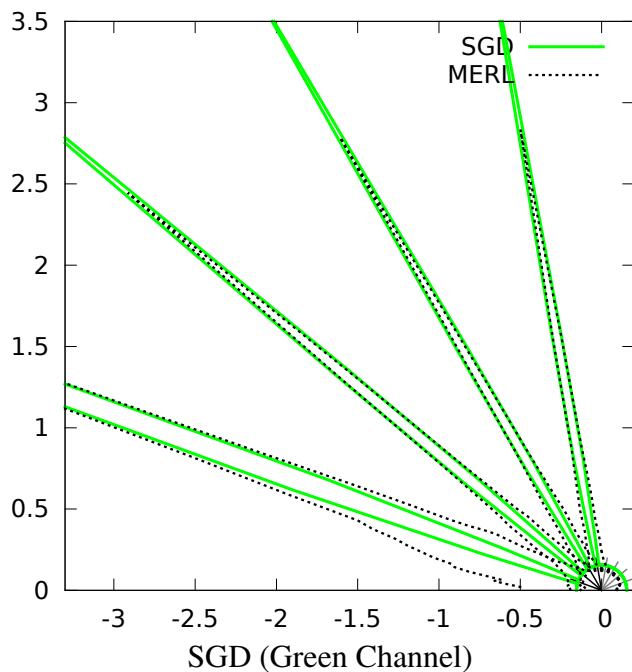
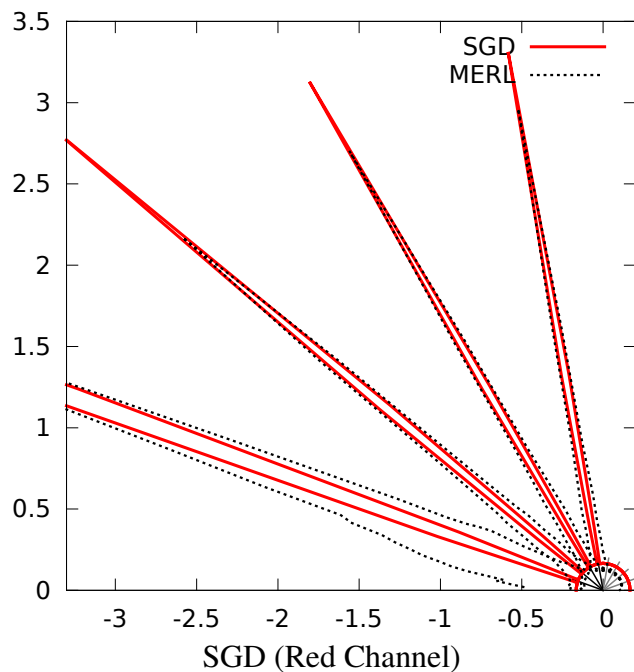
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0141611	0.0710113	6.40406e-05	0.159422	0.0516164	-0.0277792	13926.7	0.0712429
Green	0.0115865	0.0670906	0.000138867	0.283527	0.10318	-0.0531505	5668.82	0.0720965
Blue	0.00842477	0.015769	0.00224354	0.734323	2.36643	1.36643	167.824	0.11404

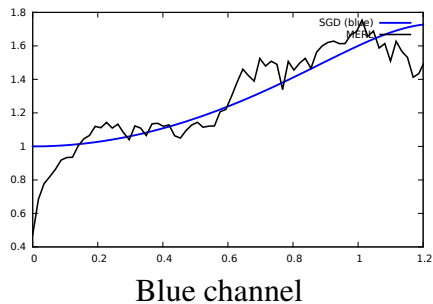
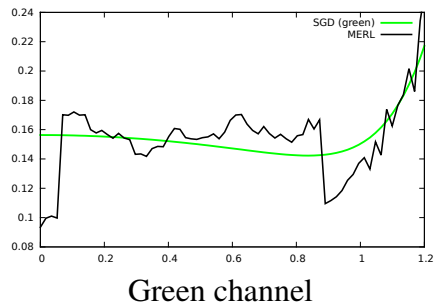
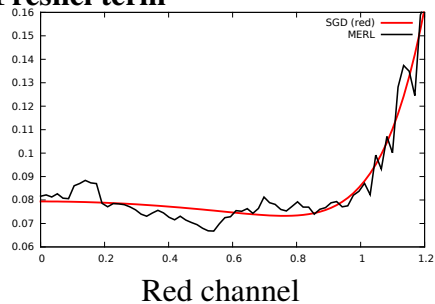
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	31.0579	1.02439e+76	176.231	1.20757
Green	5.63563	5.08786e+53	148.745	1.14062
Blue	8.52534e-05	2.96855e-07	29.0282	-0.241968

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *silver-metallic-paint2*

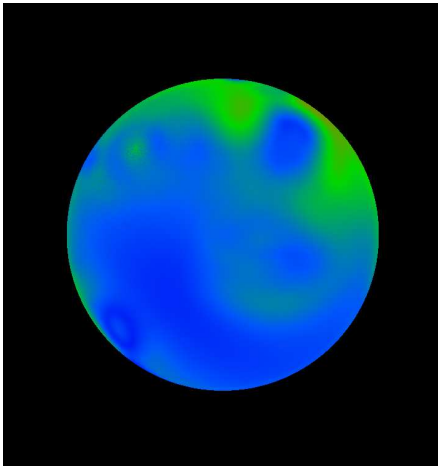
Rendered Images



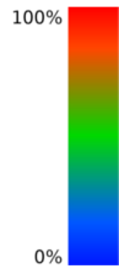
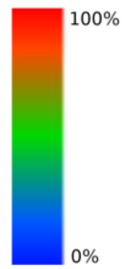
SGD



Reference



SGD (Lab difference)



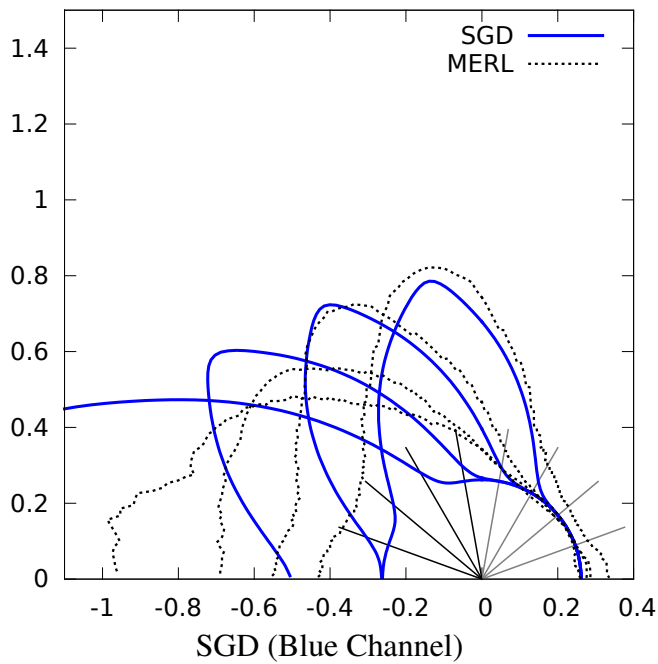
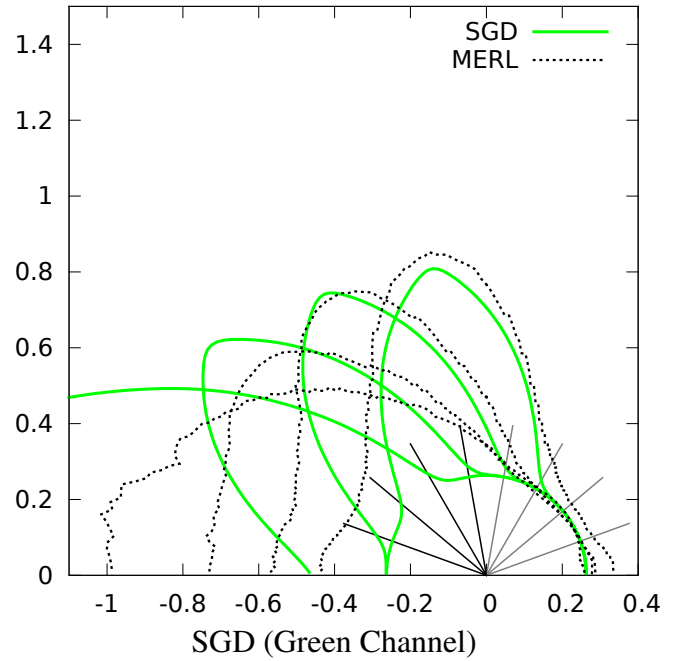
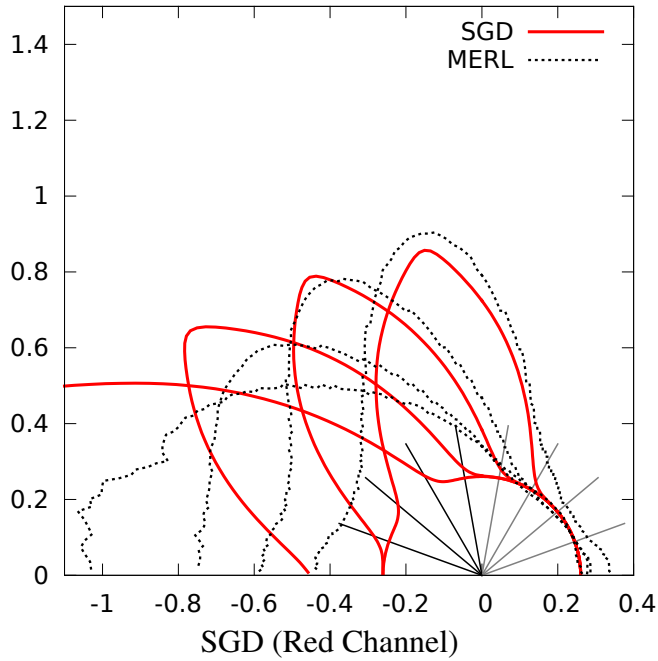
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0554792	0.121338	0.029859	0.144097	1.03749e-14	-1	31.9005	0.021384
Green	0.0573803	0.115673	0.0303706	0.104489	3.52034e-15	-1	32.1514	0.0187248
Blue	0.0563376	0.10966	0.0358666	0.158163	4.41778e-12	-1	26.5685	0.0175762

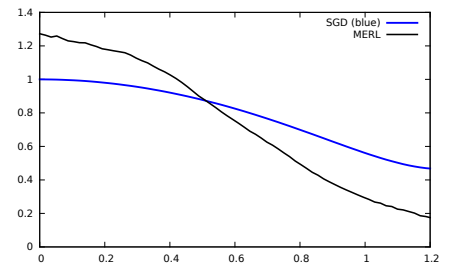
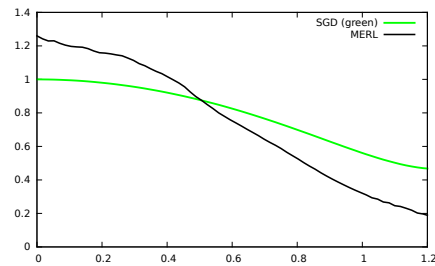
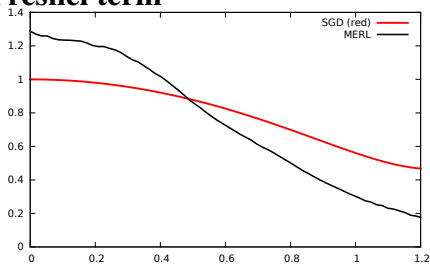
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	6.08248	0.00761403	23.5891	0.435405
Green	5.89319	0.0839948	20.6786	0.54017
Blue	5.95156	0.00138703	23.3297	0.34665

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *silver-metallic-paint*

Rendered Images



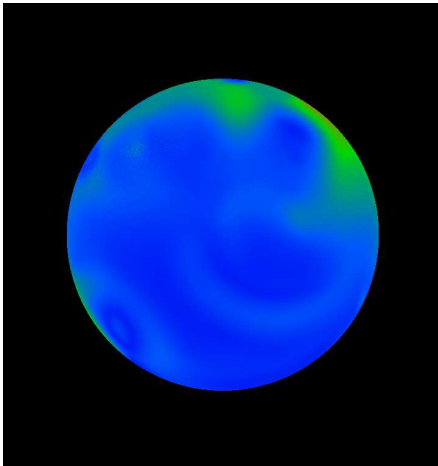
SGD



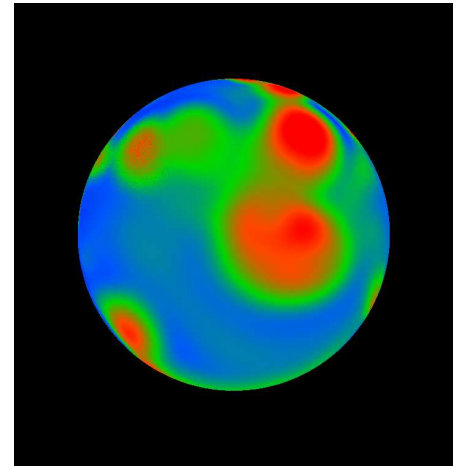
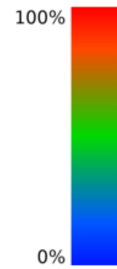
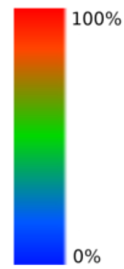
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

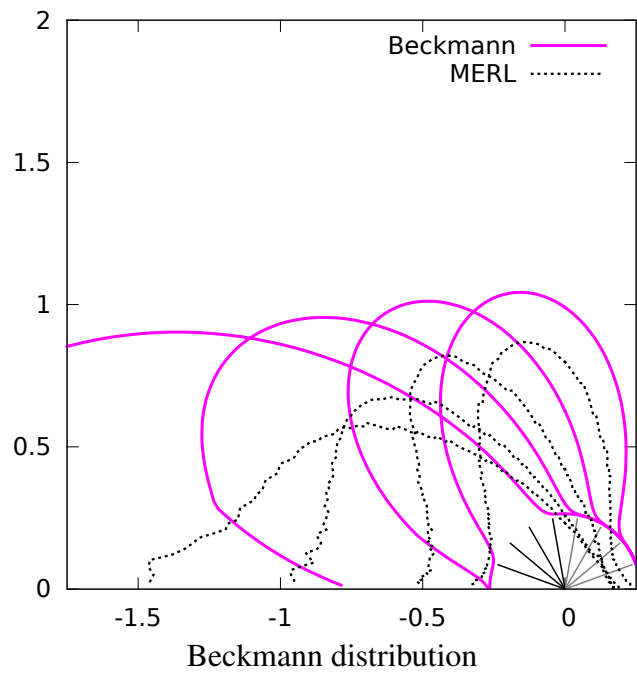
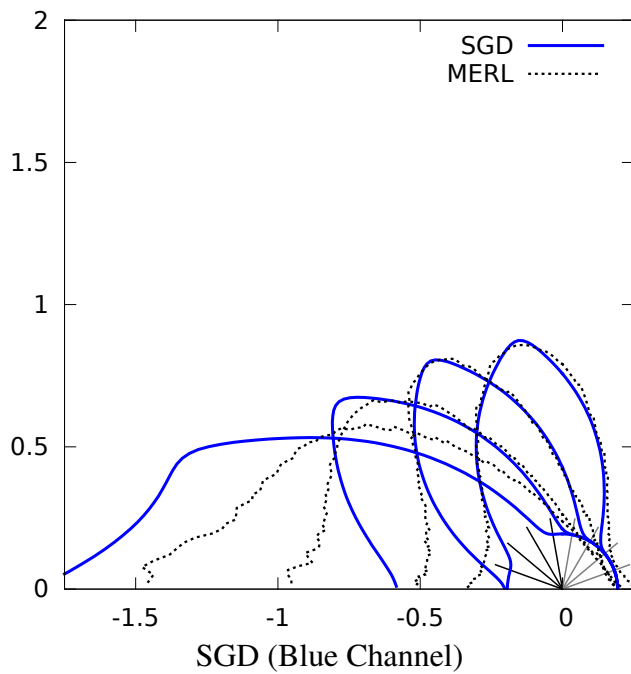
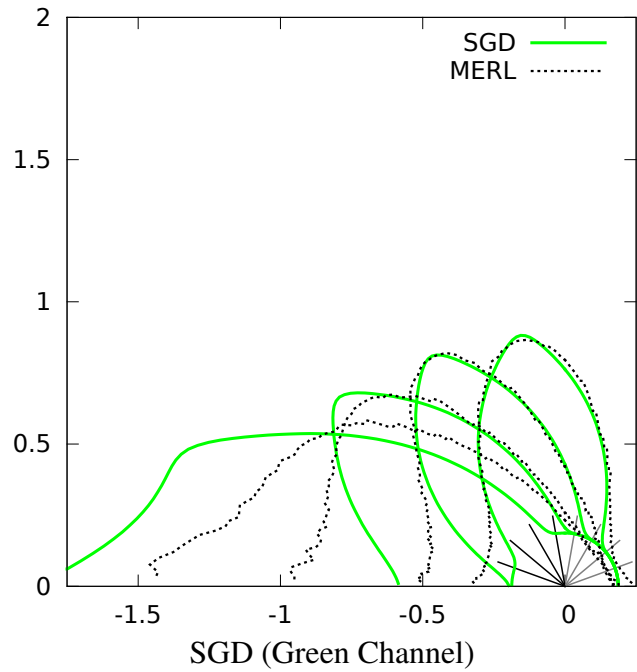
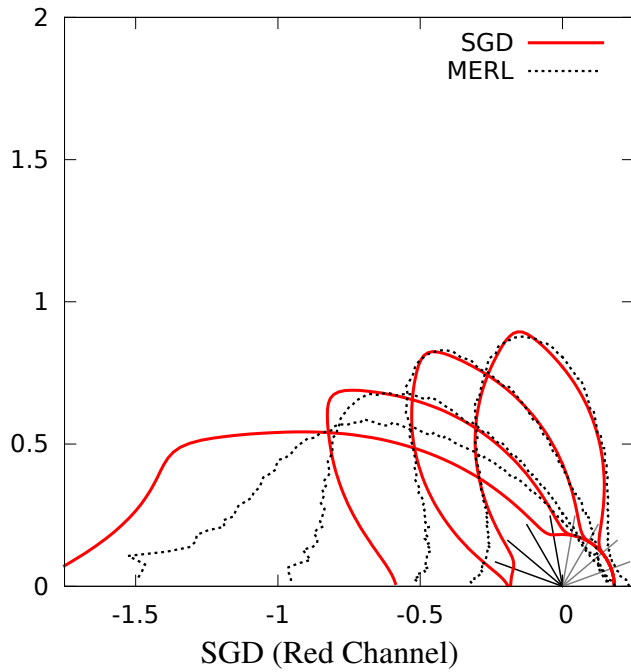
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0189497	0.173533	0.037822	0.165579	5.66903e-12	-1	25.1551	0.0122324
Green	0.0205686	0.168901	0.038145	0.162955	1.65276e-14	-1	24.9957	0.0117672
Blue	0.0228822	0.165266	0.0381908	0.160835	4.28399e-14	-1	25.0003	0.0113004

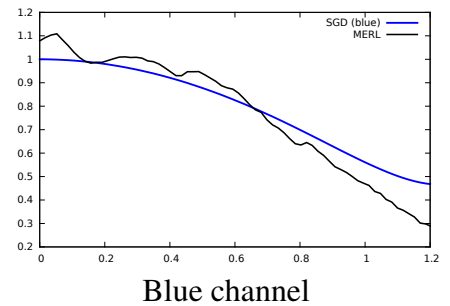
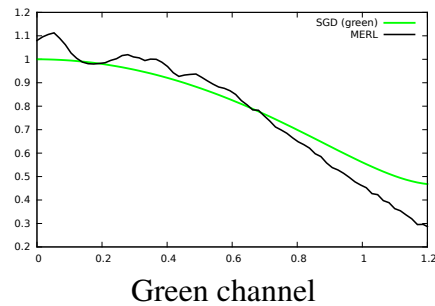
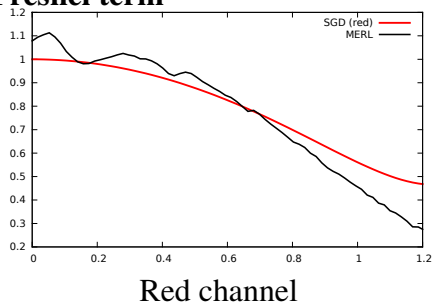
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	5.92591	0.000684235	23.4725	0.310575
Green	5.90225	0.000840795	23.1898	0.317996
Blue	5.89007	0.000995926	23.0144	0.324938

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *silver-paint*

Rendered Images



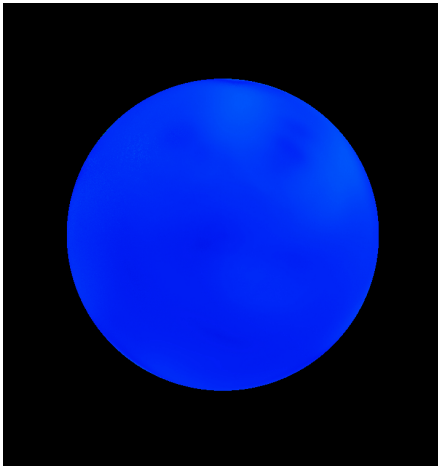
SGD



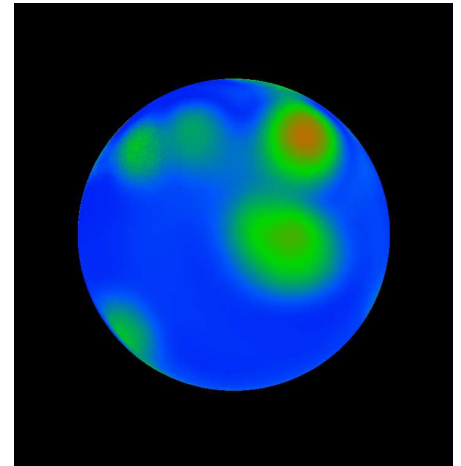
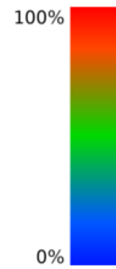
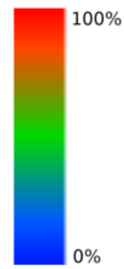
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

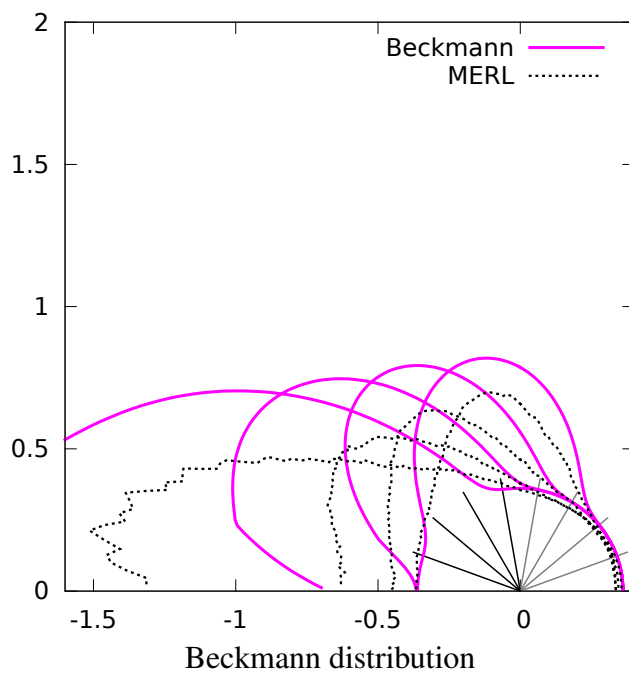
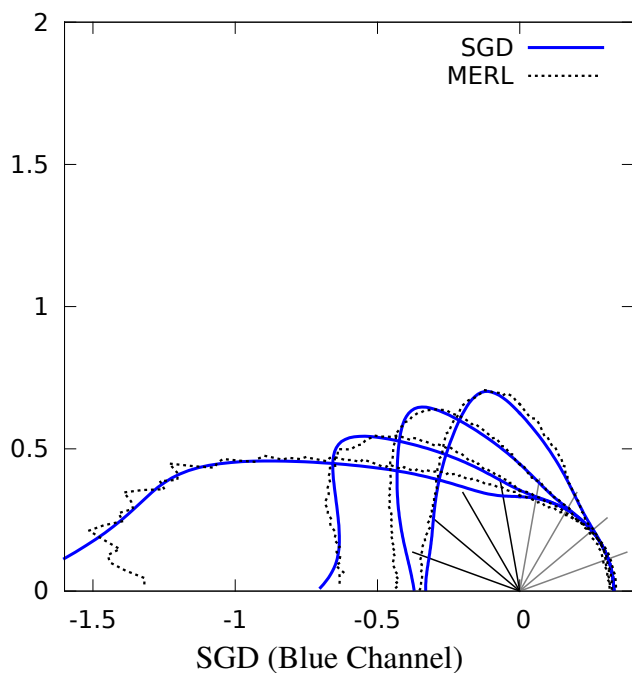
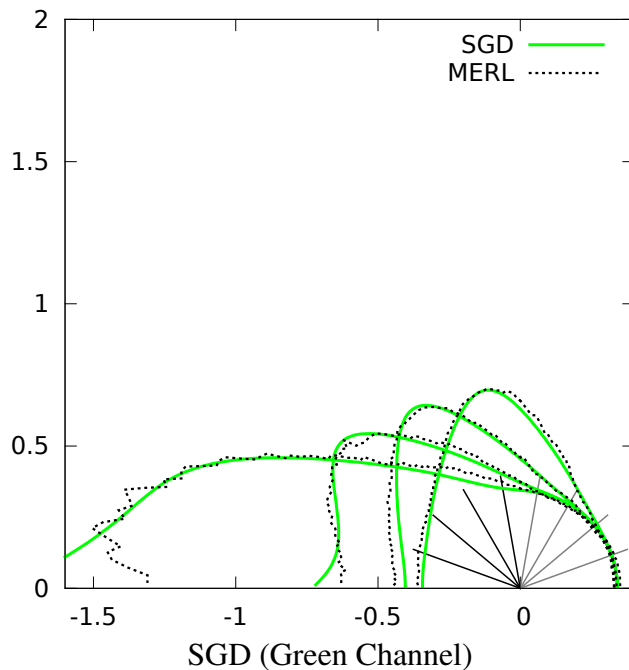
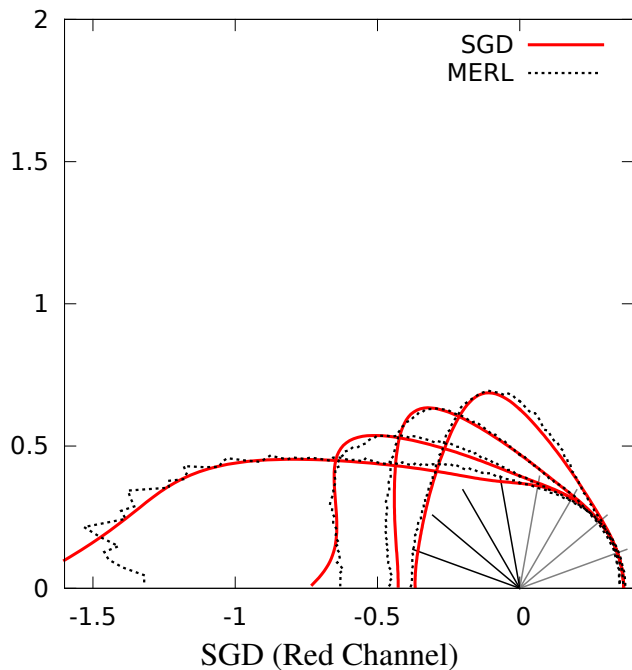
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.152796	0.30418	0.110819	0.640378	2.37347e-13	-0.350607	7.21531	0.00361589
Green	0.124616	0.30146	0.105318	0.641115	7.68194e-13	-0.355433	7.46519	0.00384995
Blue	0.113375	0.283174	0.0785677	0.445228	2.9434e-12	-0.359297	10.8289	0.00444223

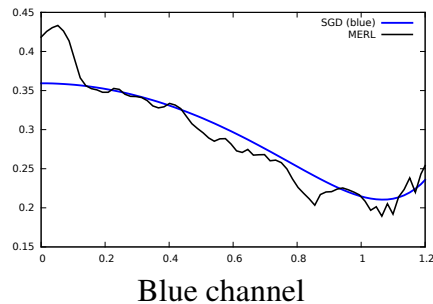
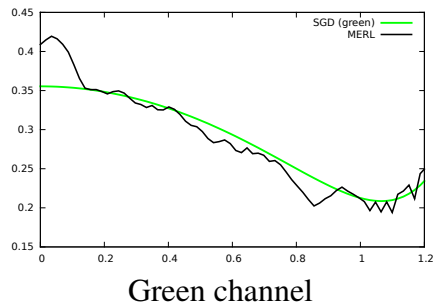
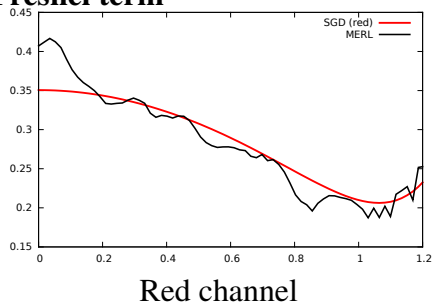
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.06016	9.71666e-08	24.1475	-0.281384
Green	2.97652	1.09342e-07	24.5083	-0.257633
Blue	3.78287	9.82336e-08	25.6757	-0.200968

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *special-walnut-224*

Rendered Images



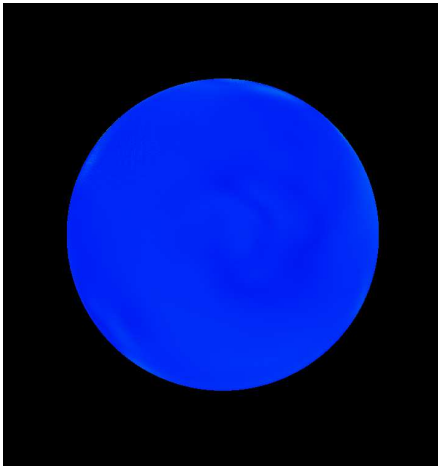
SGD



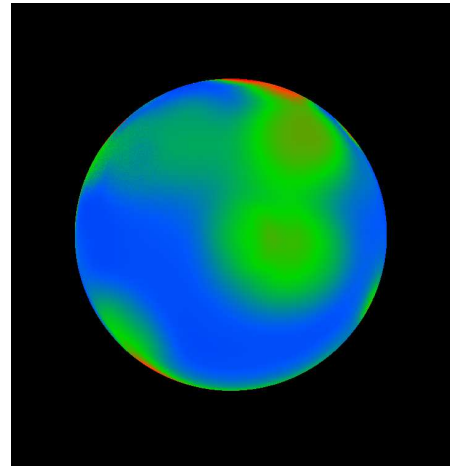
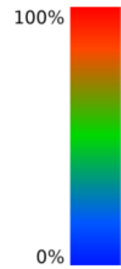
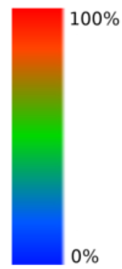
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

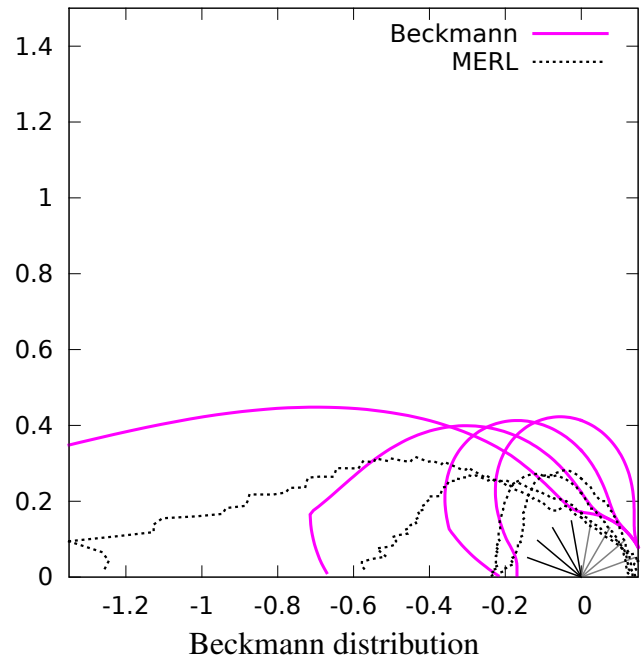
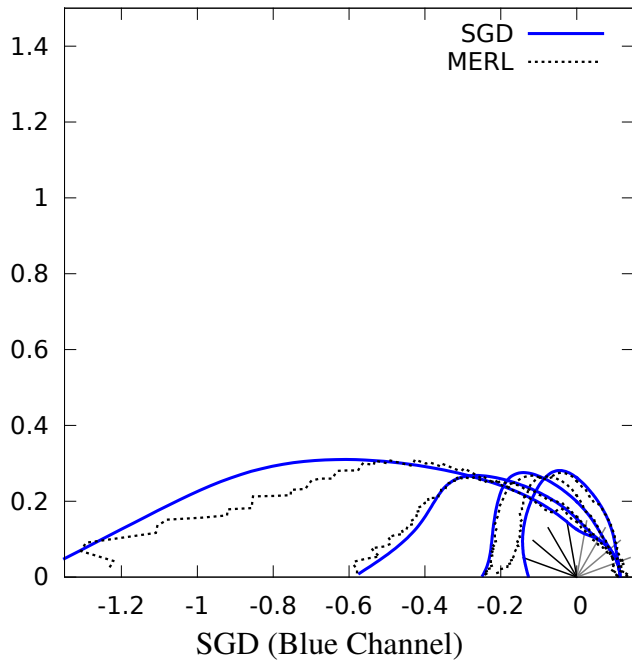
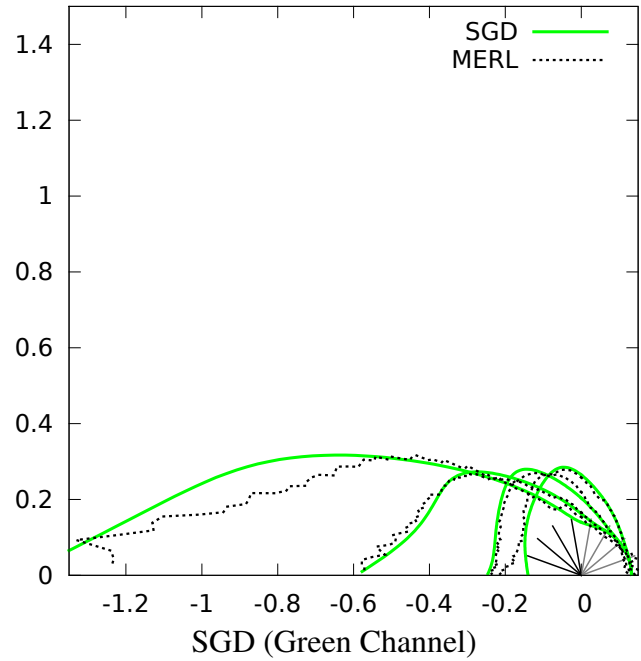
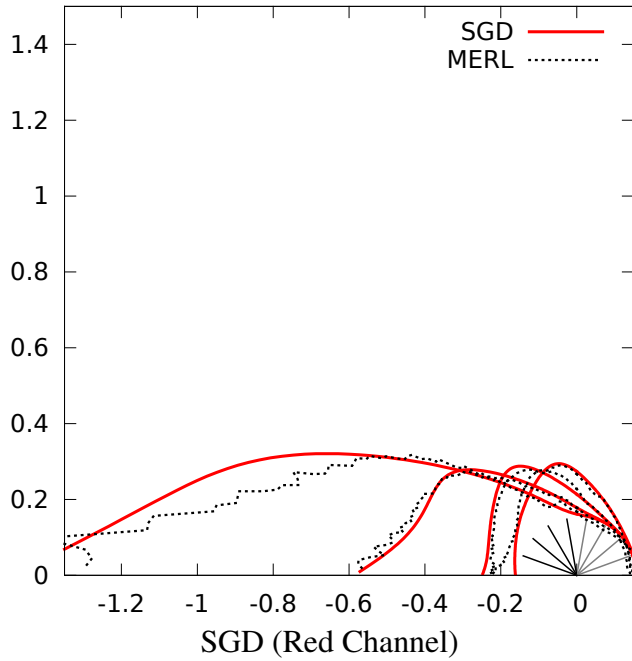
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0121712	0.209603	0.117091	0.548899	0.0808859	0.0327605	7.42314	0.000934753
Green	0.00732998	0.216118	0.119932	0.524858	0.0802614	0.0324012	7.41578	0.000878135
Blue	0.00463072	0.211885	0.131119	0.569425	0.0789982	0.0274637	6.77215	0.000758769

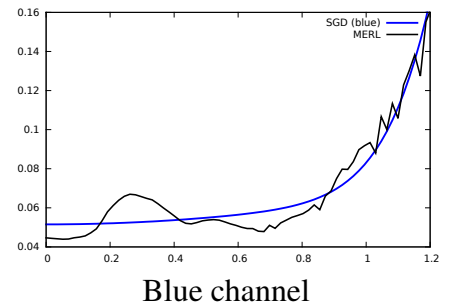
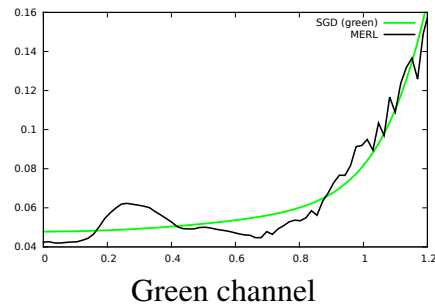
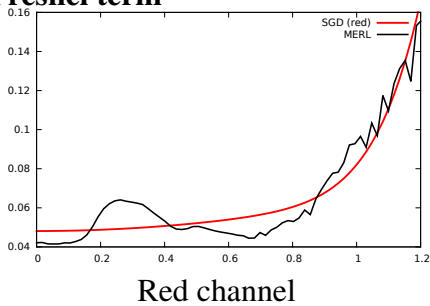
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.61532	1.19182e-07	22.9756	-0.31158
Green	3.82778	1.03098e-07	22.7318	-0.332257
Blue	3.71096	1.08004e-07	22.2976	-0.35462

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-black-phenolic*

Rendered Images



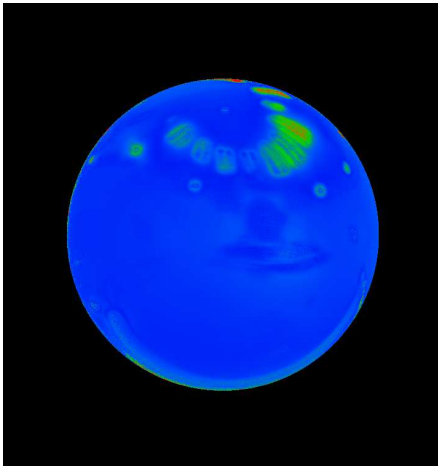
SGD



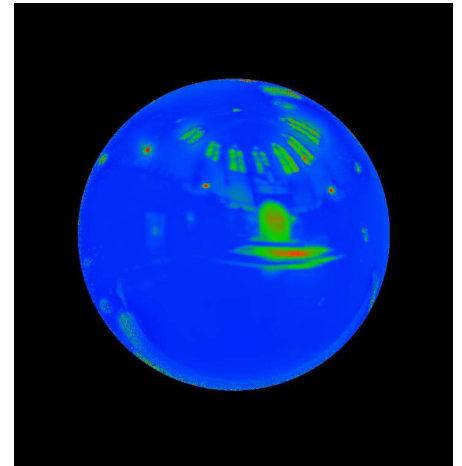
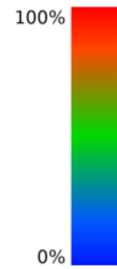
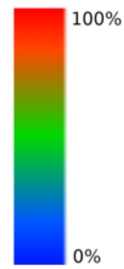
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

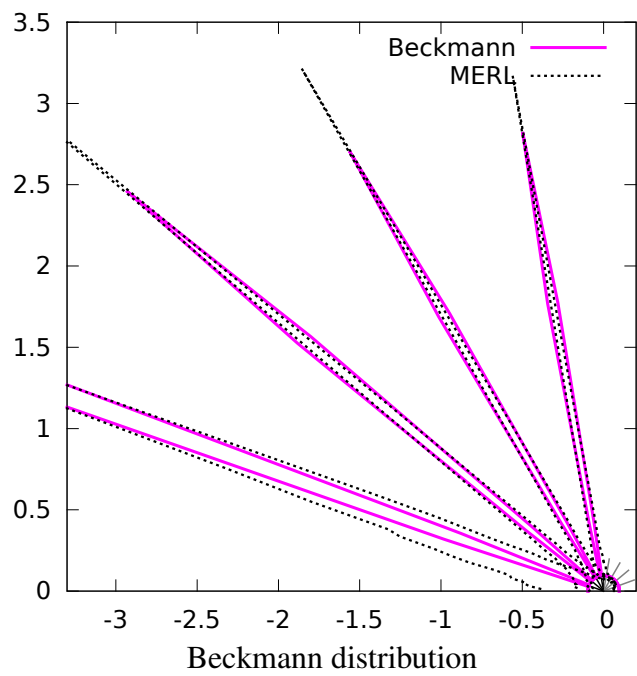
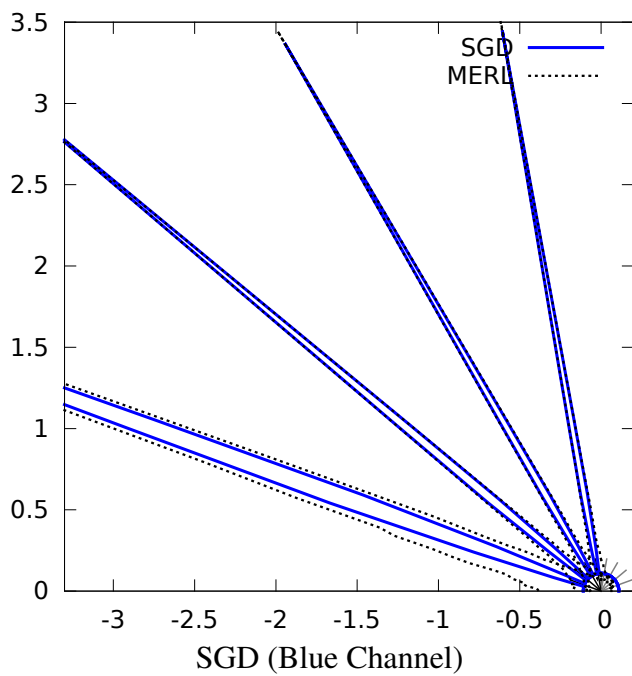
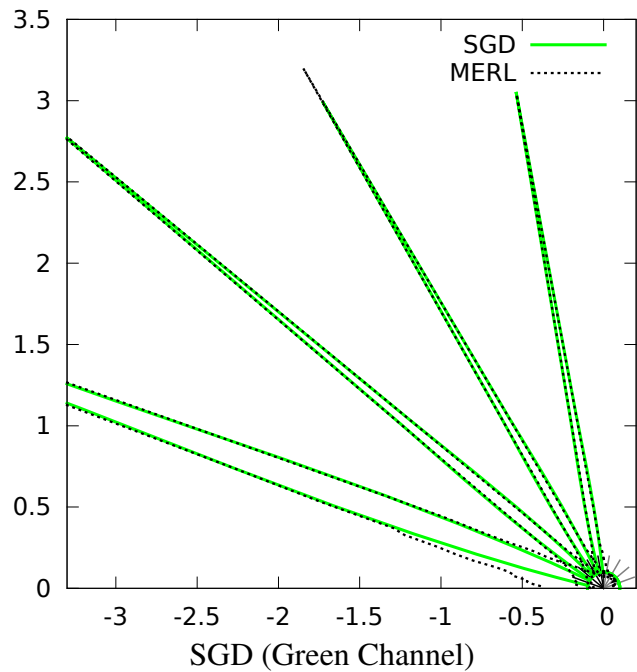
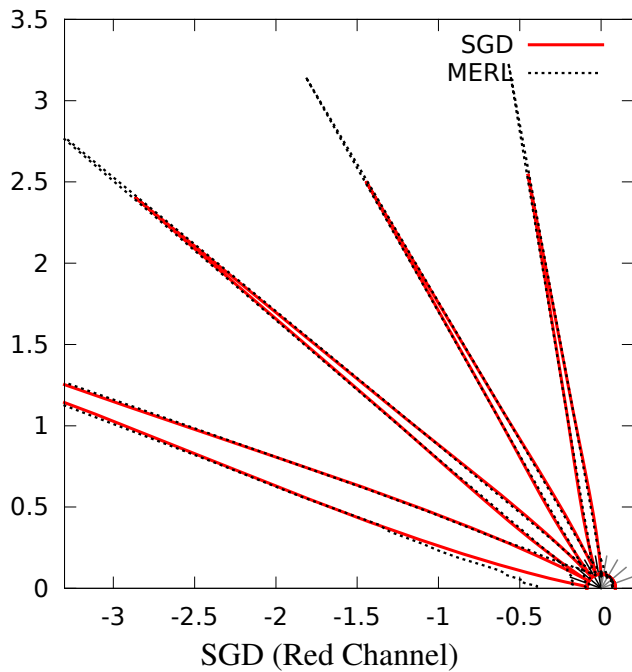
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00212164	0.0881574	0.00119167	0.616914	0.122486	0.0482851	395.656	0.0311874
Green	0.00308282	0.0923246	0.000641898	0.578026	0.0907984	0.0348218	781.361	0.0437836
Blue	0.00410253	0.0398117	0.000186605	0.40121	0.13855	0.0481813	3615.49	0.0853211

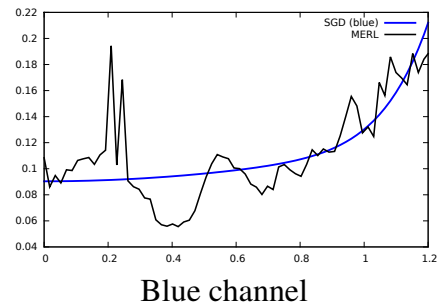
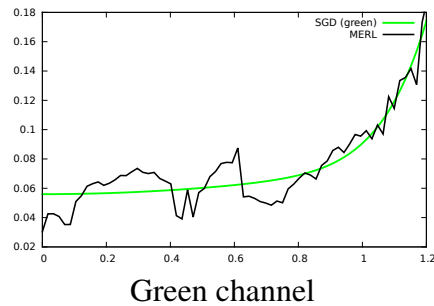
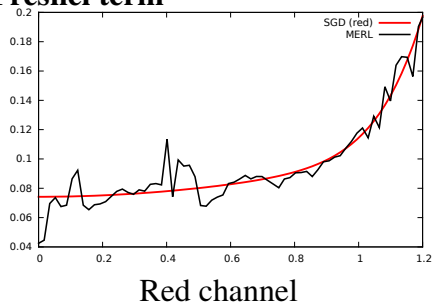
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.18051e-05	2.88932e-07	28.9748	-0.257695
Green	1.22149	6.09017e-08	200.529	0.487197
Blue	2.87626	9.79363e-08	331.336	0.524707

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-blue-phenolic*

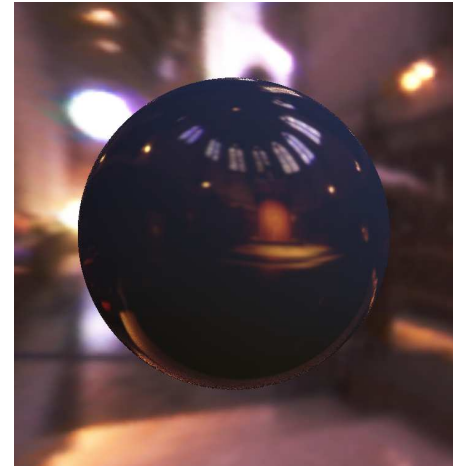
Rendered Images



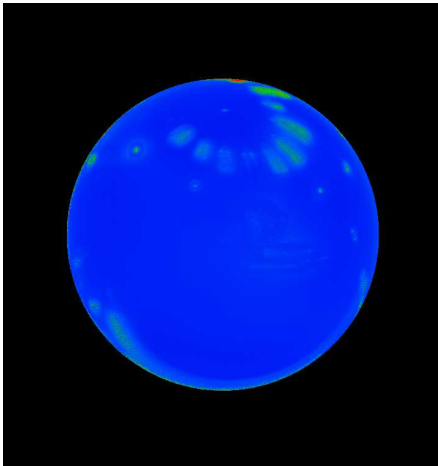
SGD



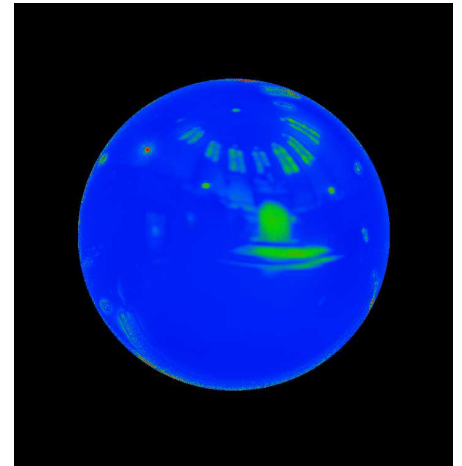
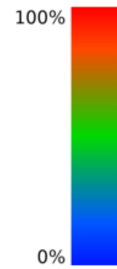
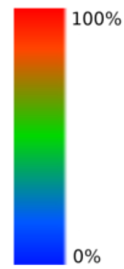
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

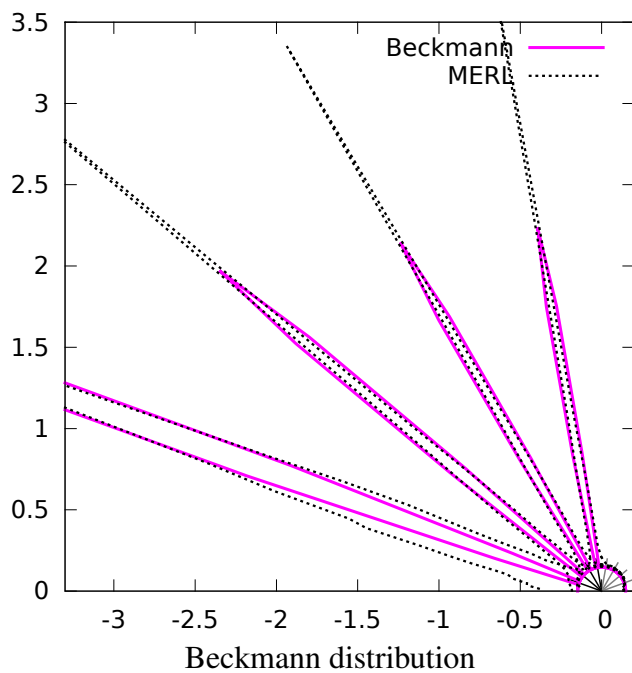
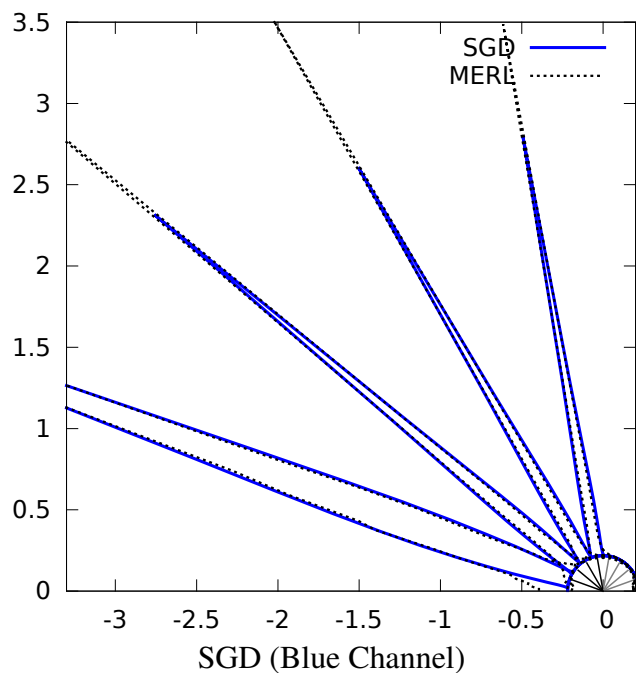
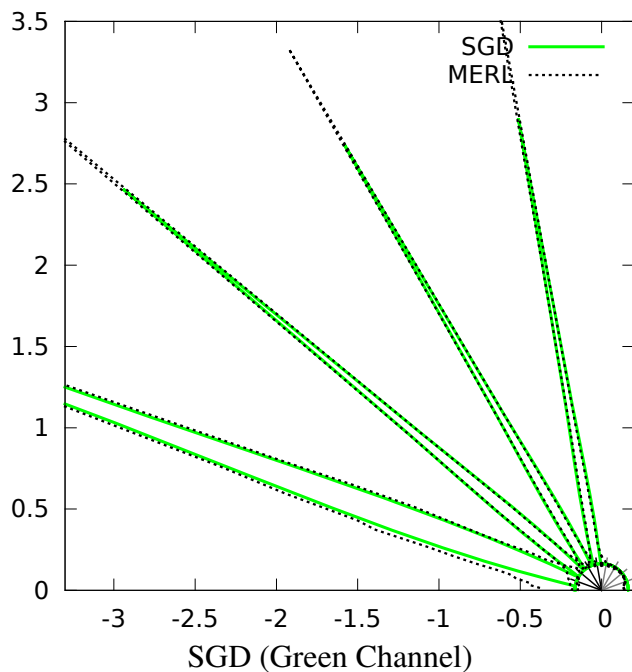
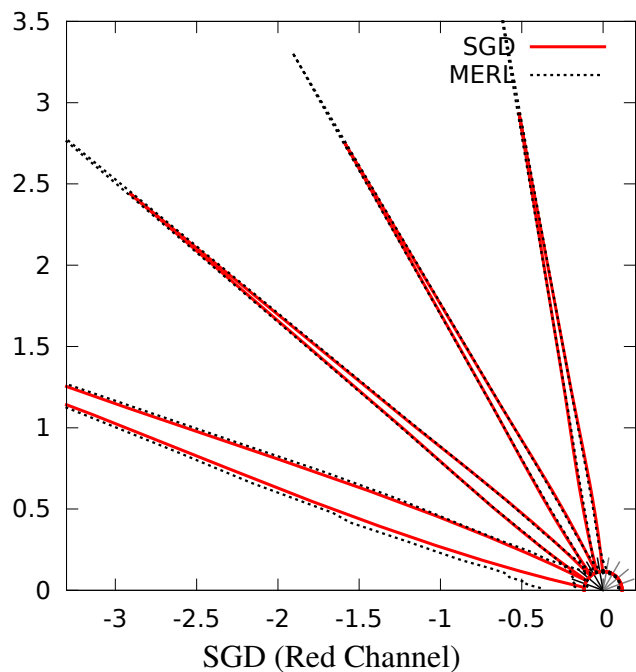
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00497564	0.1077	0.000918571	0.570978	0.0354139	-0.0434314	558.482	0.0324614
Green	0.0138836	0.0898232	0.0010348	0.639916	0.0488958	-0.0294427	431.708	0.0338654
Blue	0.032815	0.175296	0.00176322	0.709385	0.023159	-0.039938	222.547	0.057732

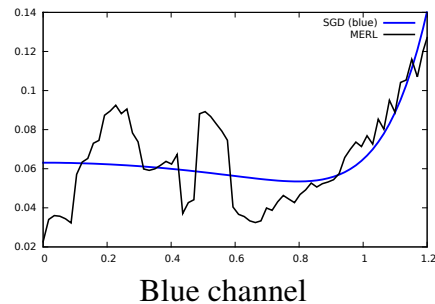
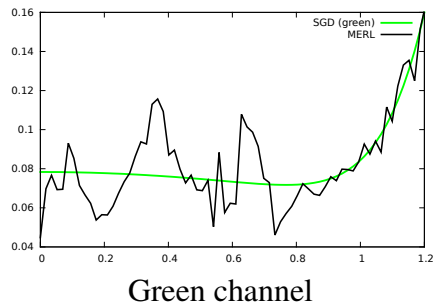
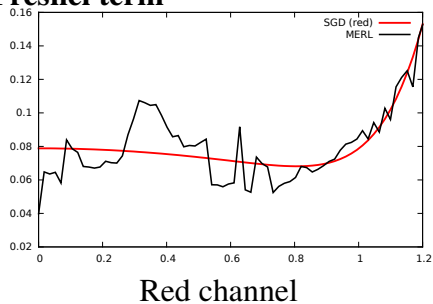
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.57872e-06	3.33356e-07	28.5289	-0.272244
Green	2.38985e-05	3.3336e-07	32.1362	-0.141224
Blue	6.87316e-05	3.2851e-07	30.3802	-0.19005

BRDF lobes in the incidence plane (Cubic root applied)

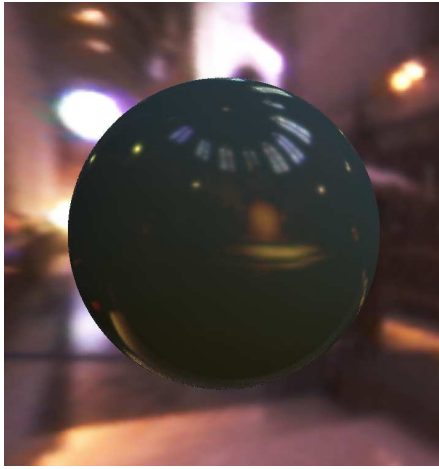


Fresnel term



Material Name: *specular-green-phenolic*

Rendered Images



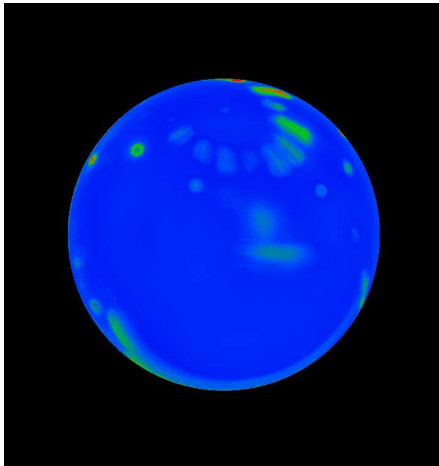
SGD



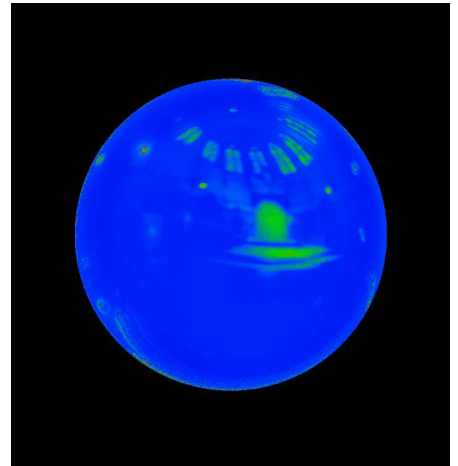
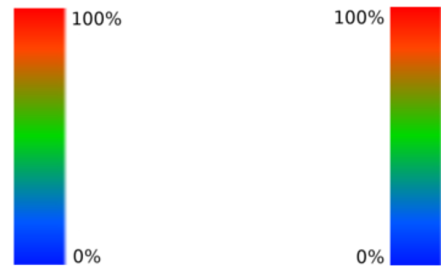
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

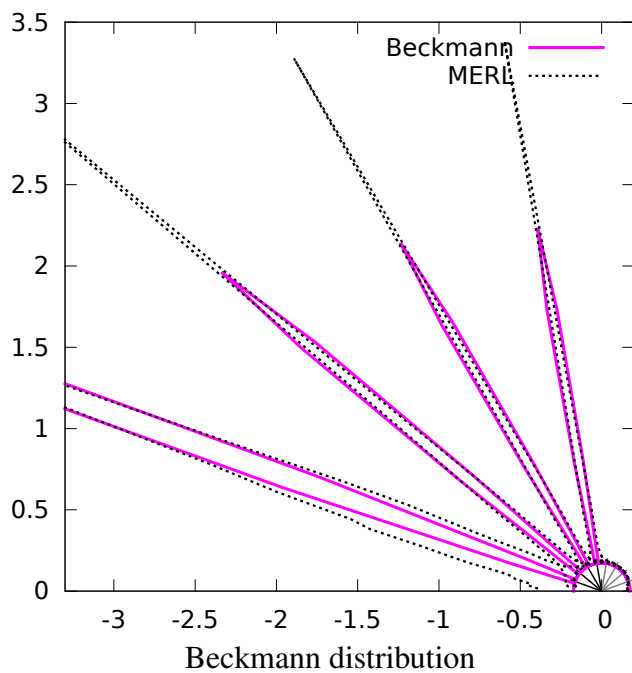
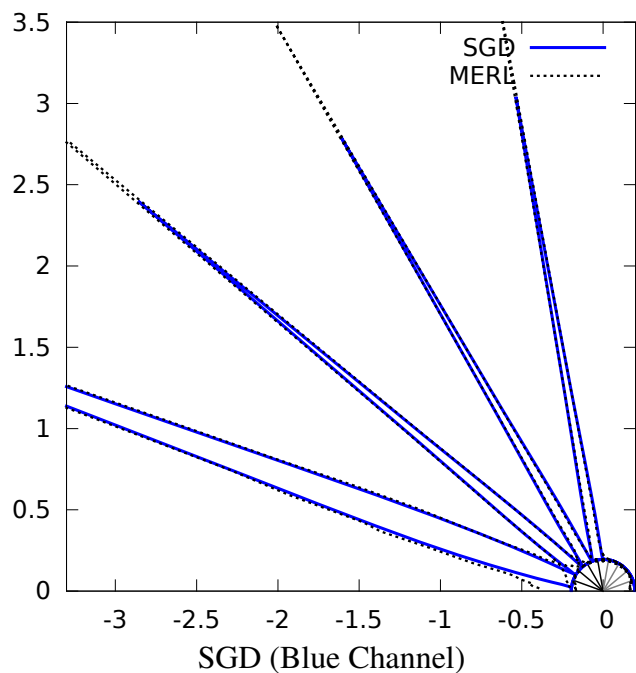
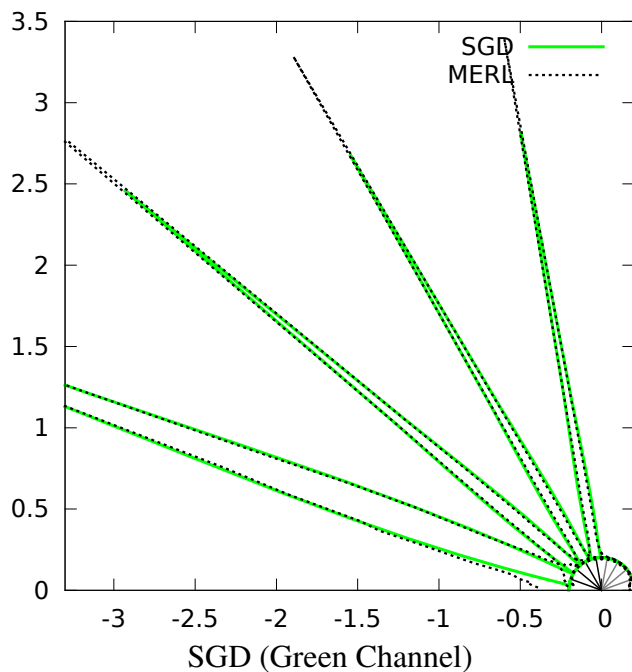
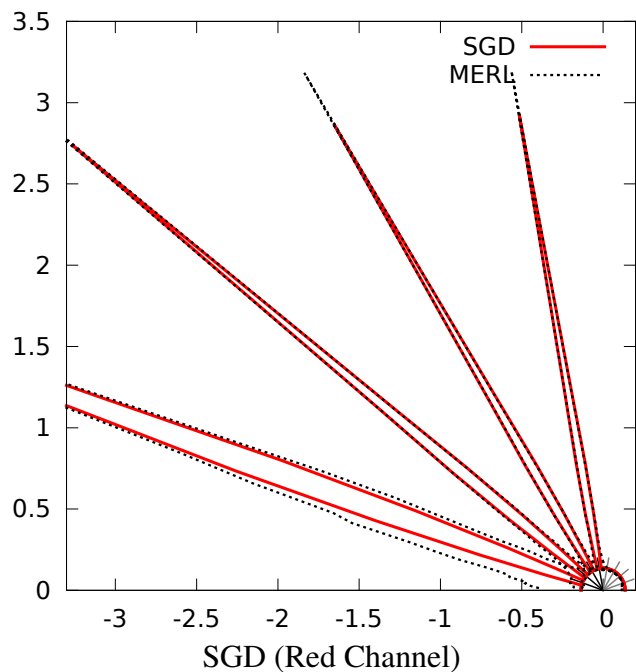
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.00781782	0.0688449	0.000307494	0.365481	0.129429	0.047932	2313.47	0.0373526
Green	0.0259654	0.144658	0.0010353	0.585805	0.0443676	-0.0136055	482.847	0.0450242
Blue	0.0233739	0.143654	0.00155331	0.787512	5.423e-12	-0.0592743	206.646	0.0470867

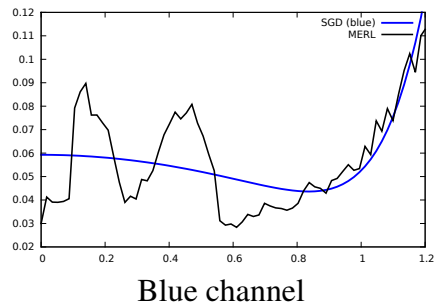
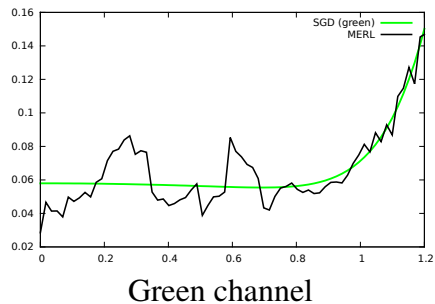
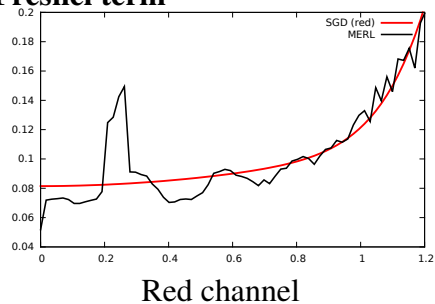
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.55591	1.03804e-07	256.625	0.511901
Green	5.3306e-06	3.47154e-07	28.2901	-0.277015
Blue	0.000279403	3.16888e-07	38.0691	0.00513058

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-maroon-phenolic*

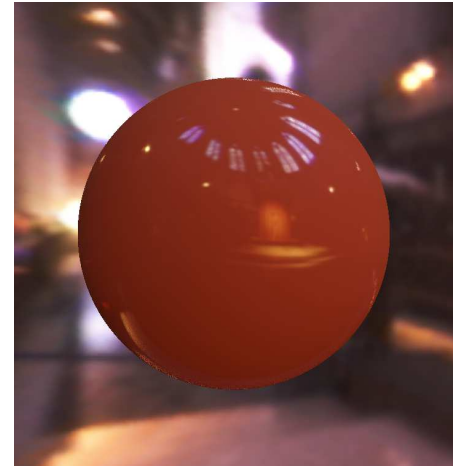
Rendered Images



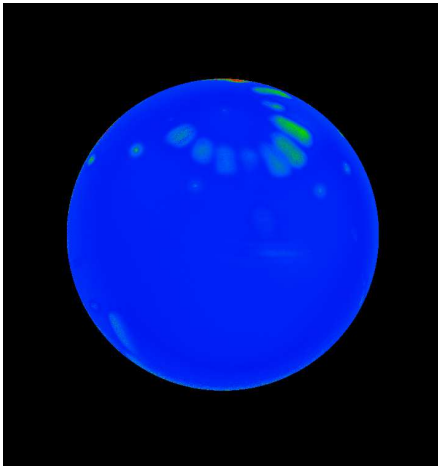
SGD



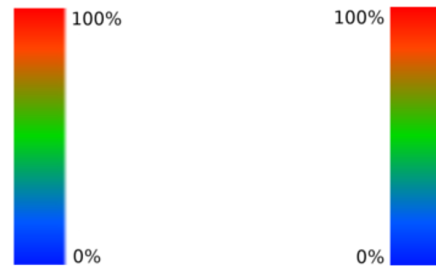
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

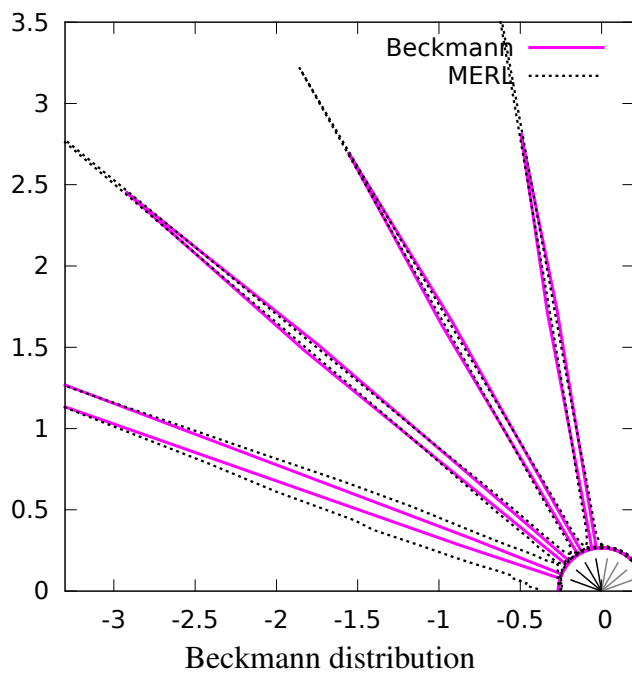
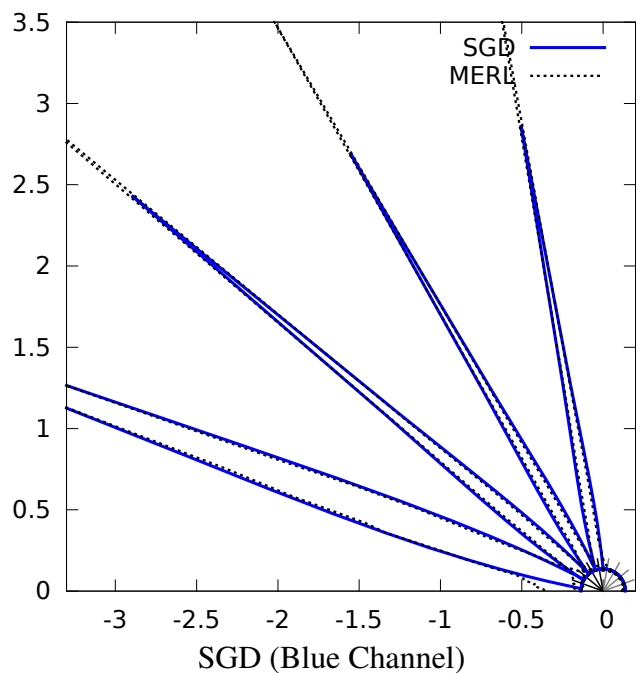
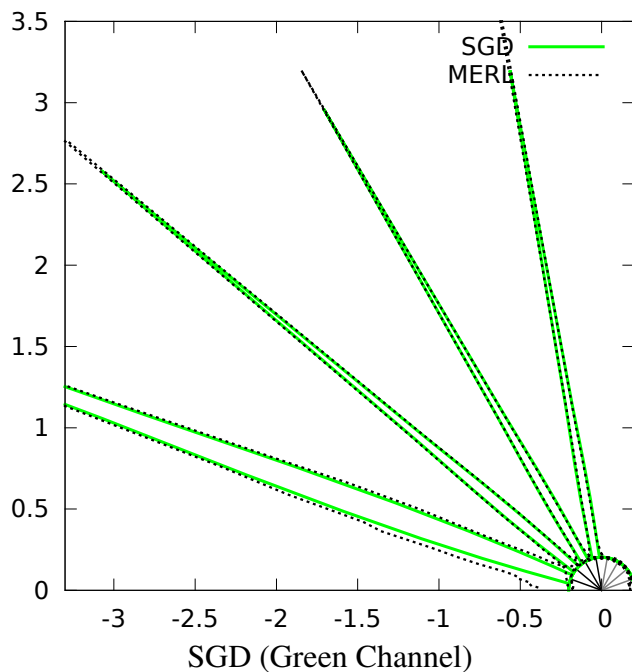
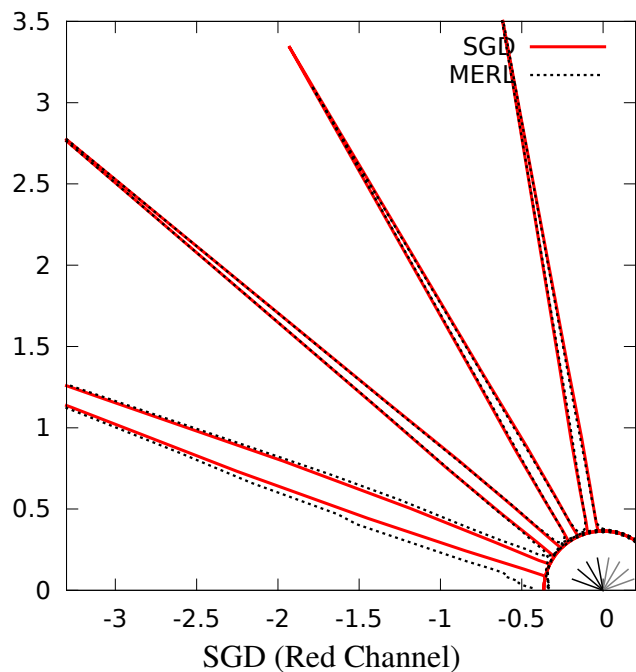
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.152486	0.0761775	0.000342958	0.4052	0.0646024	-0.0555983	1961.35	0.0465516
Green	0.0263216	0.098375	0.000605578	0.553617	0.0116325	-0.0527264	868.119	0.0434438
Blue	0.00802748	0.165913	0.00144136	0.65133	0.037551	-0.0283844	306.537	0.0545231

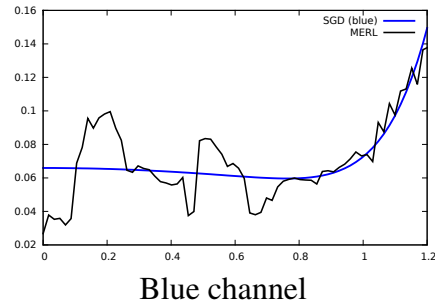
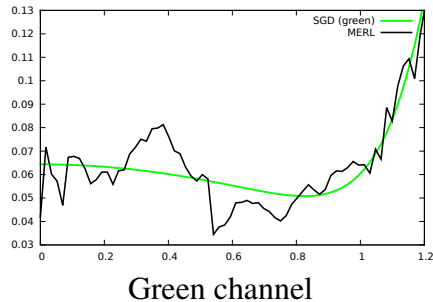
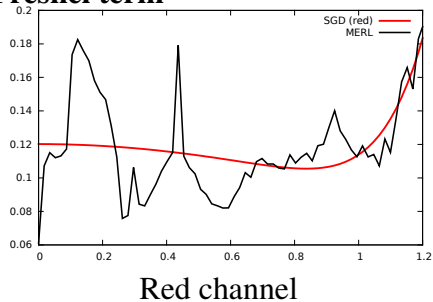
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.81751	5.70302e-08	248.591	0.506511
Green	1.361	5.89096e-08	203.707	0.488814
Blue	2.43015e-05	3.27578e-07	29.053	-0.242746

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-orange-phenolic*

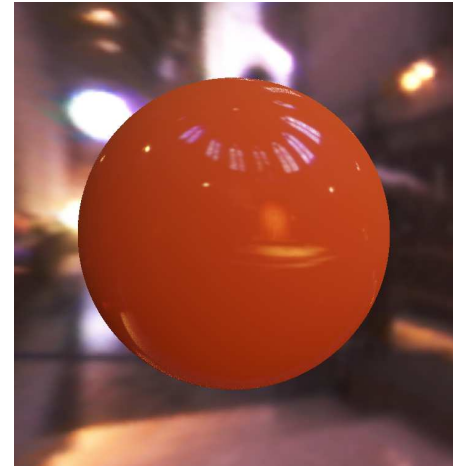
Rendered Images



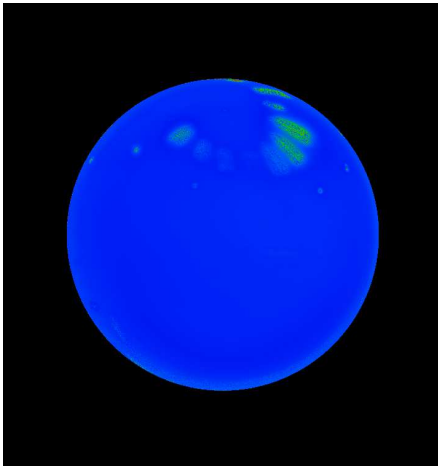
SGD



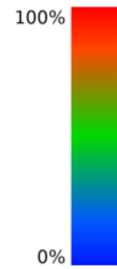
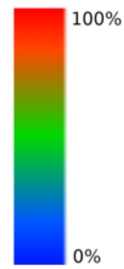
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

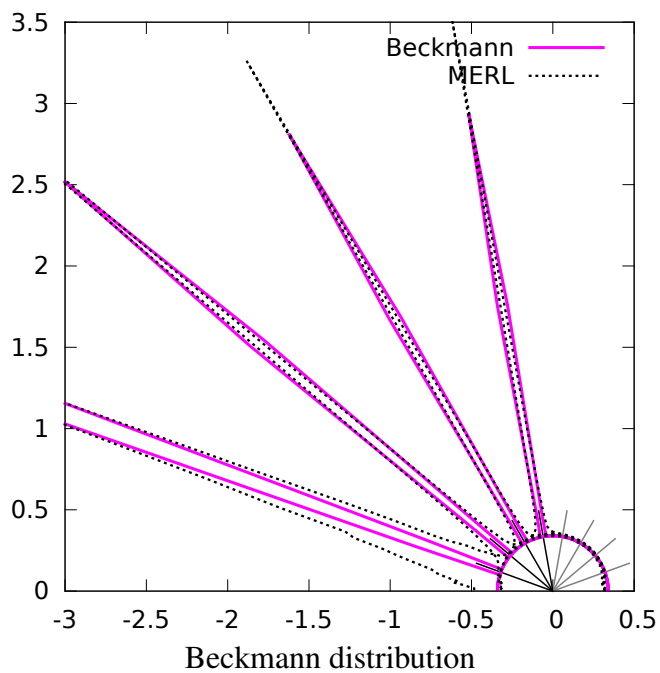
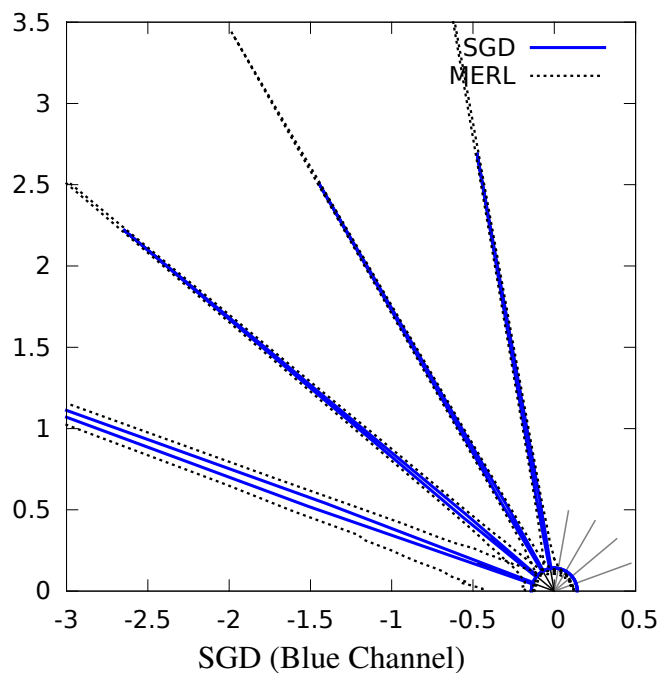
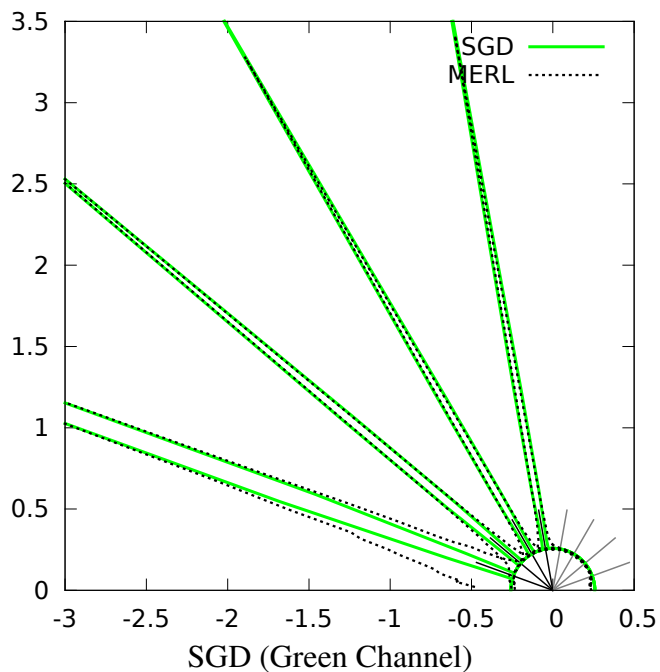
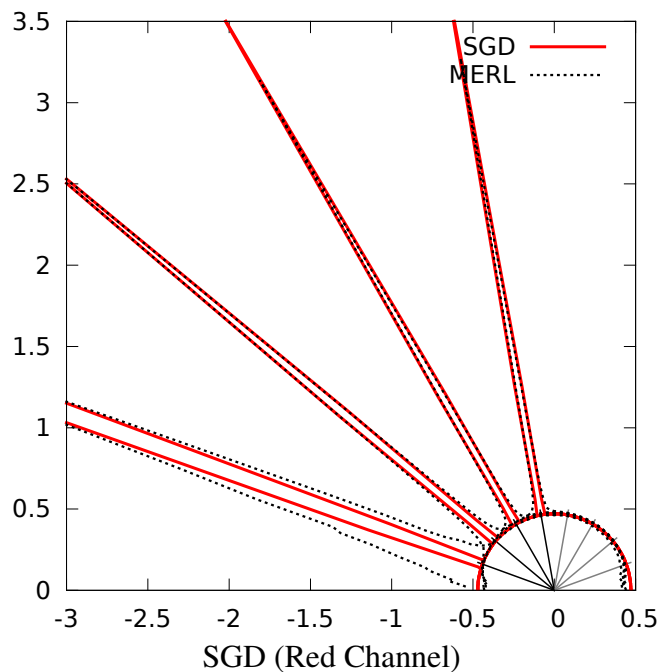
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.32771	0.051915	7.91913e-05	0.253564	0.0768695	-0.015514	10274.5	0.0405677
Green	0.0540131	0.0686764	0.000139576	0.354675	0.0496641	-0.023864	5159.16	0.0498947
Blue	0.00883213	0.0489478	1.62017e-05	3.55583e-12	0.0223538	-0.0433847	61722.9	0.0953035

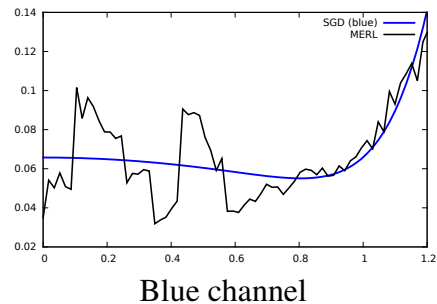
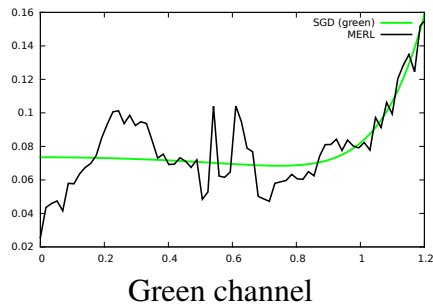
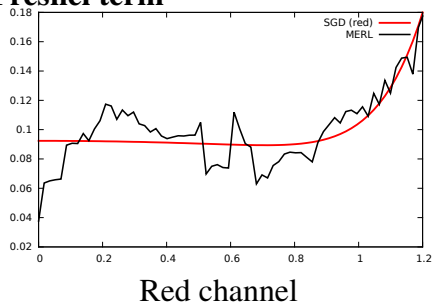
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	7.4207	2.91305e+71	170.364	1.19475
Green	3.83488	1.02522e-07	373.255	0.53082
Blue	8.72207e+06	2.30124e+07	855.811	0.608547

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-red-phenolic*

Rendered Images



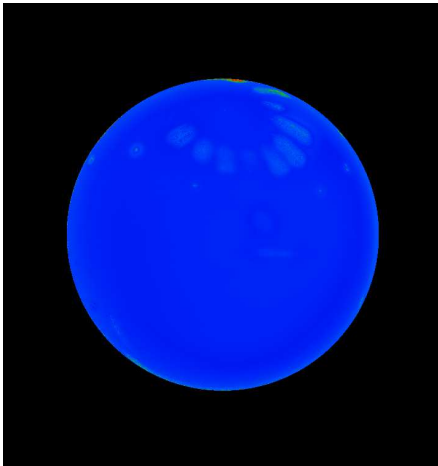
SGD



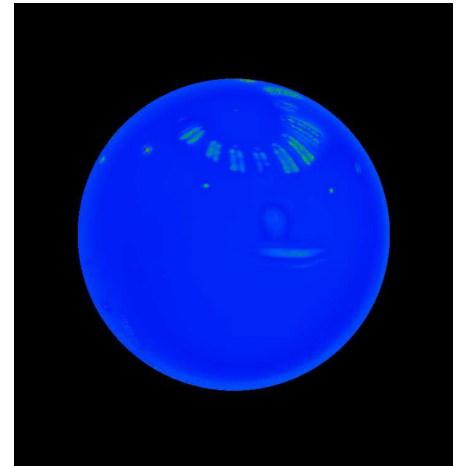
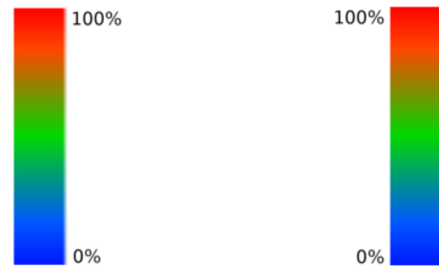
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

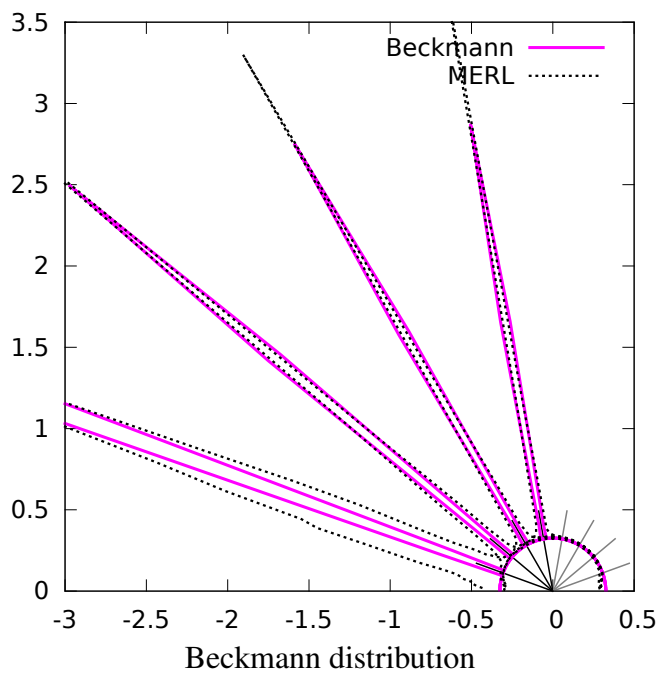
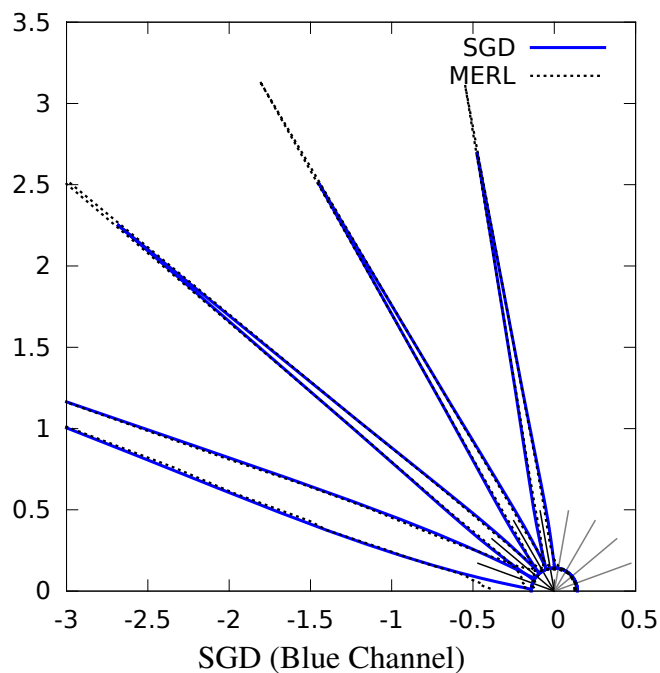
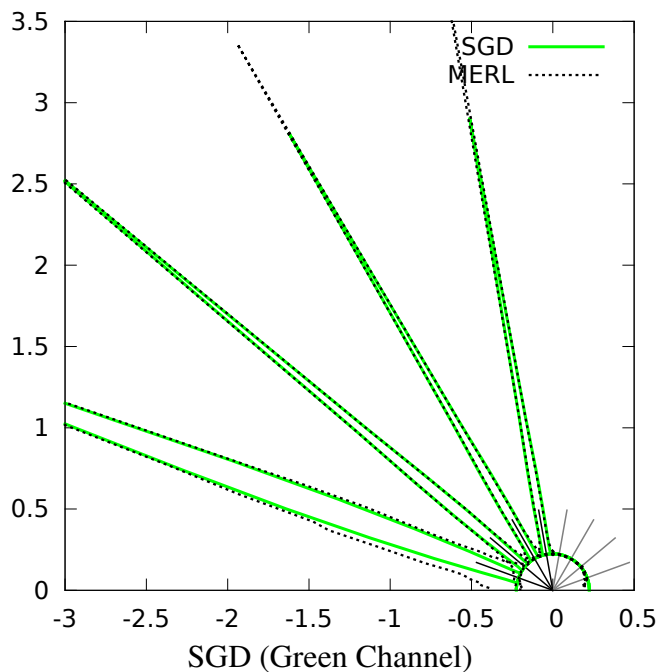
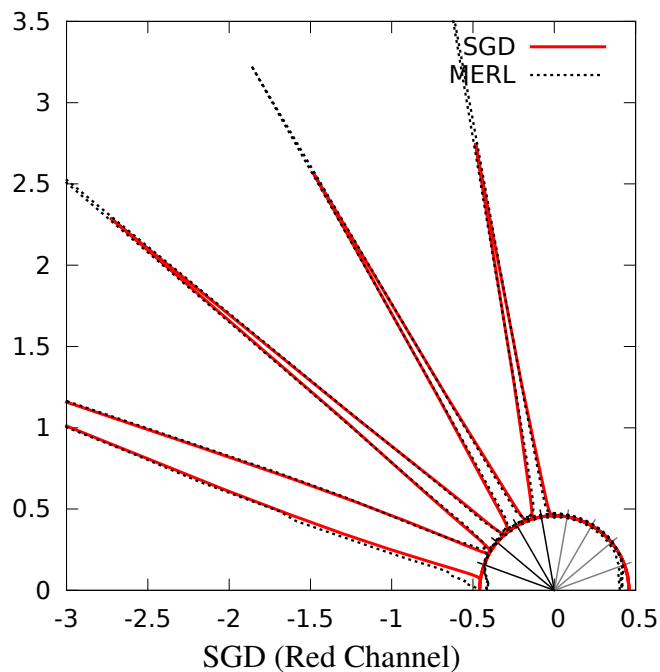
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.303563	0.151819	0.00117843	0.570146	0.0287445	-0.0386172	438.968	0.0307055
Green	0.0354891	0.0938022	0.00056476	0.524406	0.0672098	0.0144813	982.441	0.0199408
Blue	0.00899721	0.196935	0.00185124	0.732785	0.0178433	-0.0322308	201.328	0.0652829

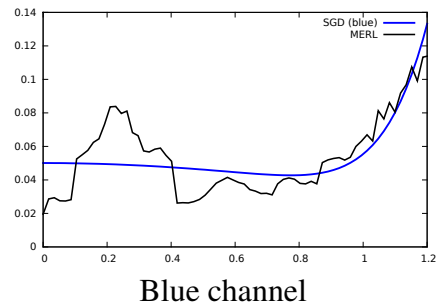
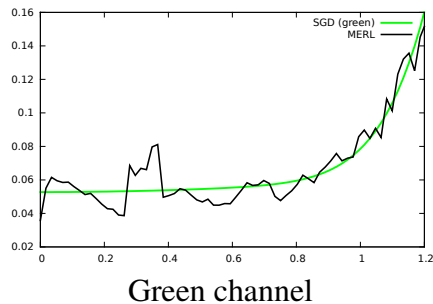
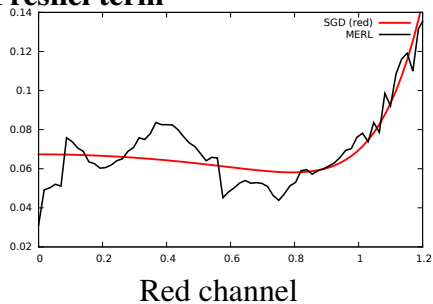
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.88657e-06	3.8194e-07	26.0046	-0.376008
Green	8.12418e-07	3.69661e-07	30.0091	-0.21799
Blue	9.95633e-05	3.03179e-07	31.3125	-0.162894

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-violet-phenolic*

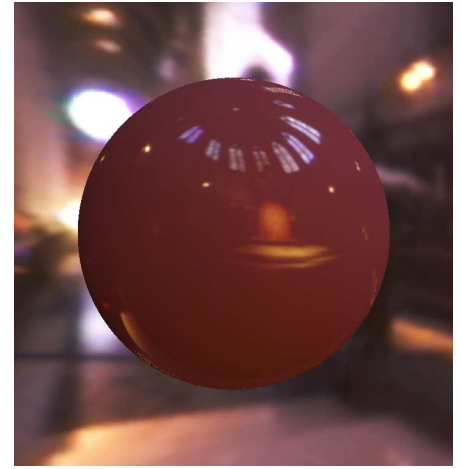
Rendered Images



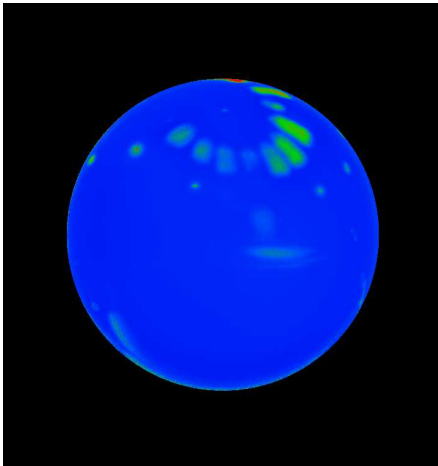
SGD



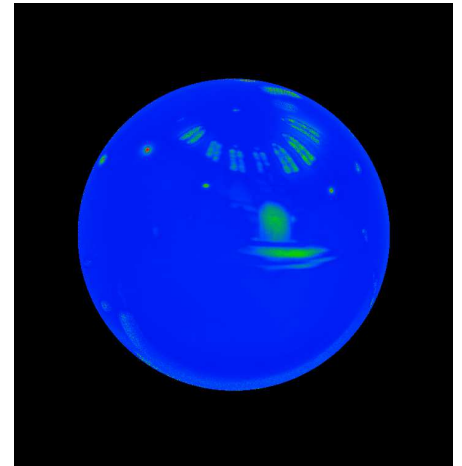
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

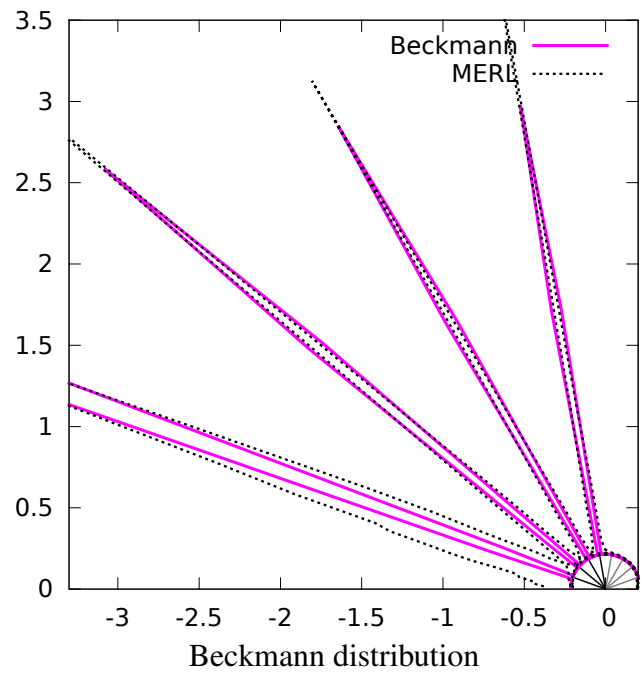
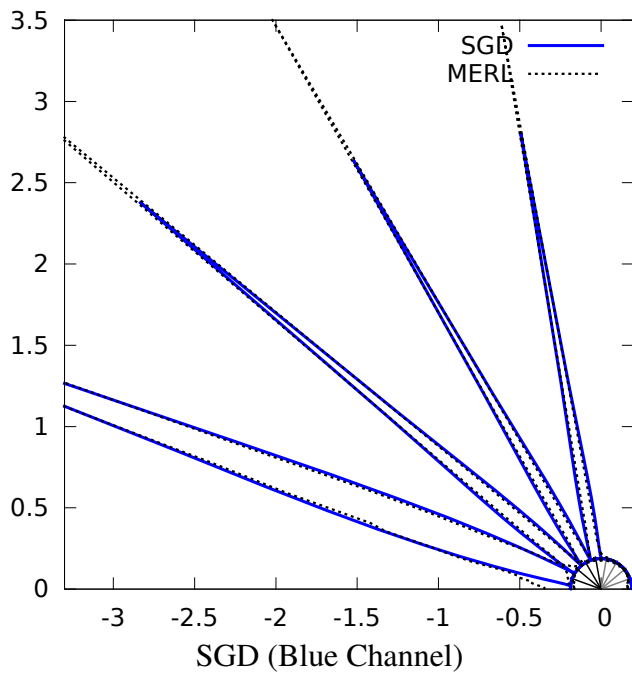
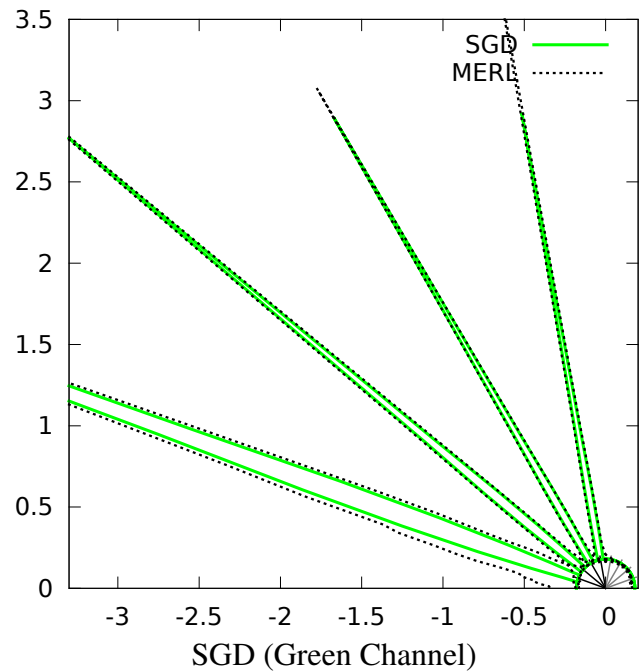
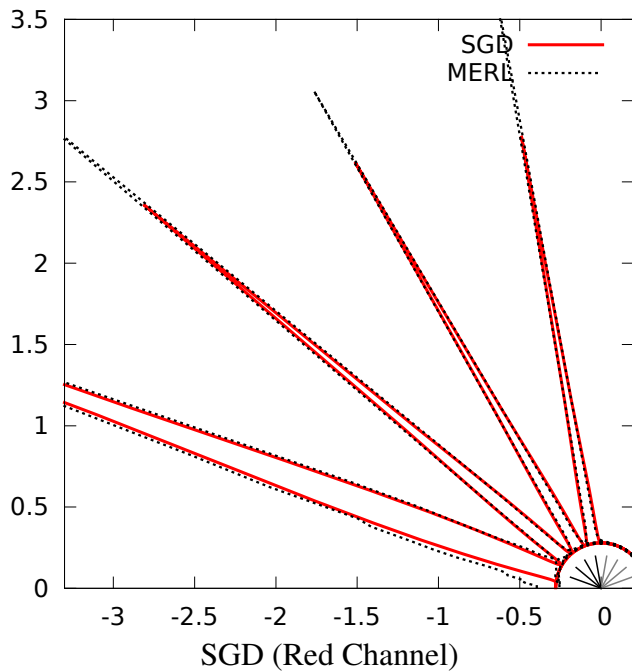
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0686035	0.108459	0.00123271	0.657484	0.0403569	-0.0295013	351.208	0.033584
Green	0.0181856	0.0471612	0.000443974	0.546753	0.121081	0.0563904	1193.45	0.0495535
Blue	0.0210368	0.171691	0.00149517	0.653065	0.035323	-0.0275623	294.897	0.0510203

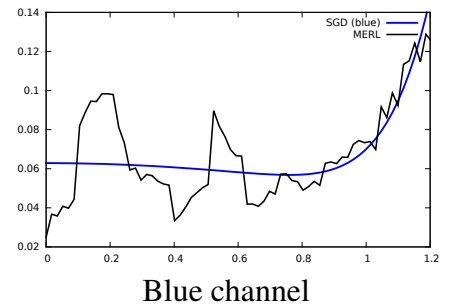
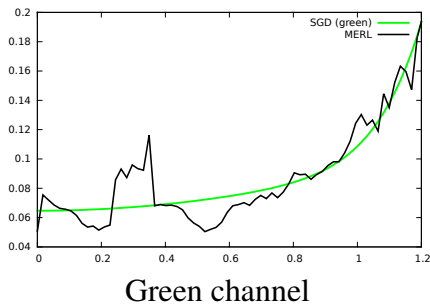
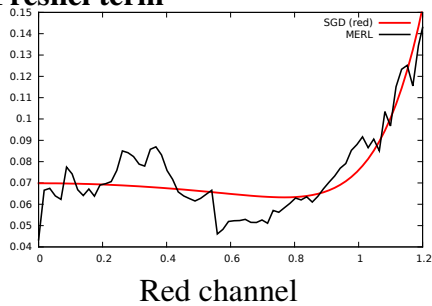
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.17585e-05	3.02028e-07	31.3319	-0.168991
Green	1.3817	6.19706e-08	234.879	0.500354
Blue	2.44051e-05	3.40809e-07	28.7237	-0.252626

BRDF lobes in the incidence plane (Cubic root applied)

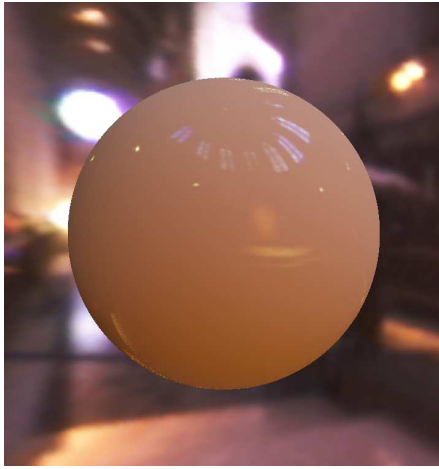


Fresnel term



Material Name: *specular-white-phenolic*

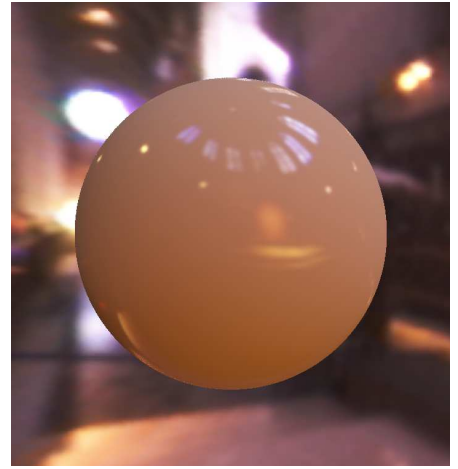
Rendered Images



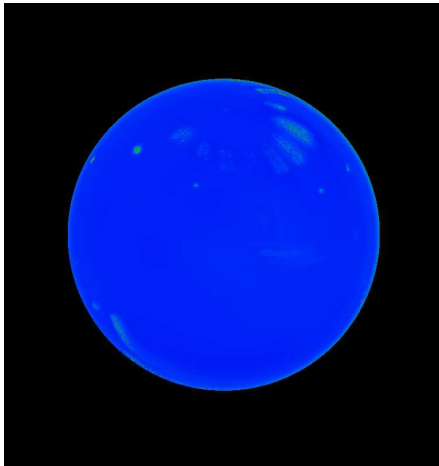
SGD



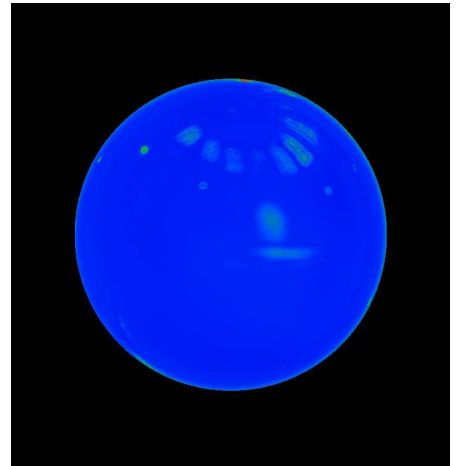
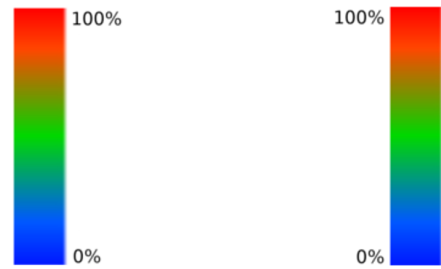
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

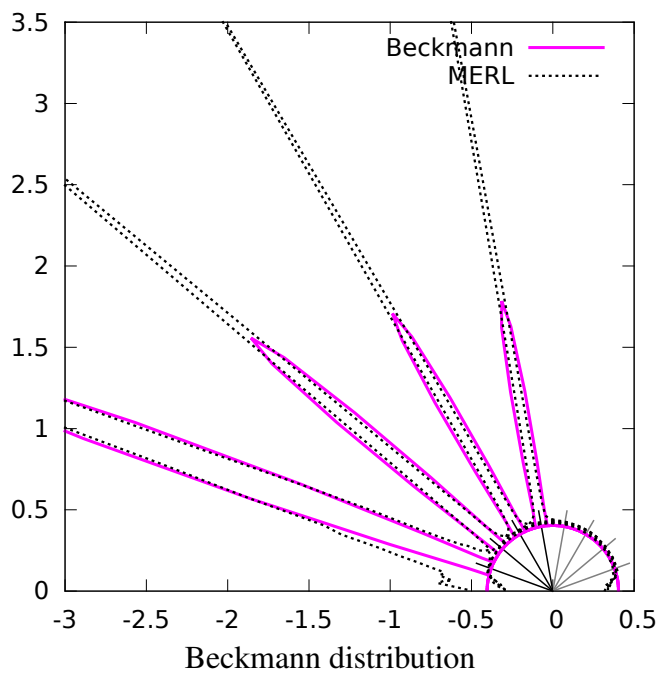
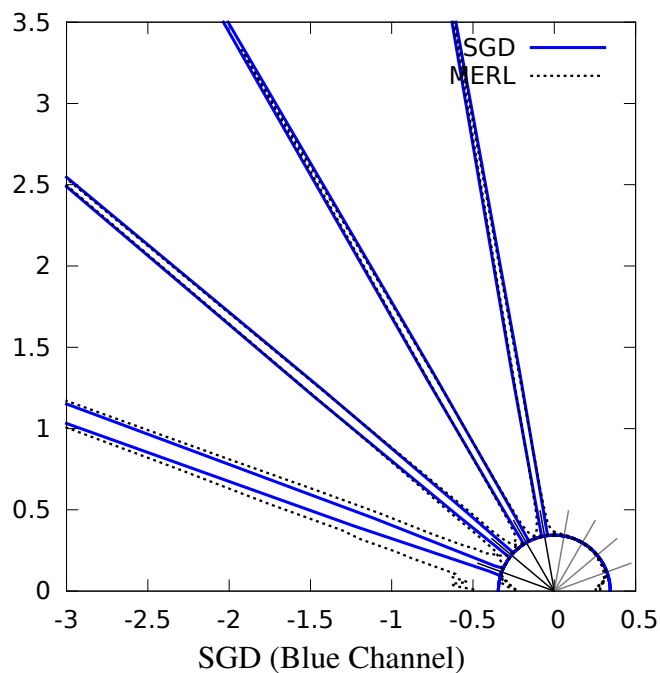
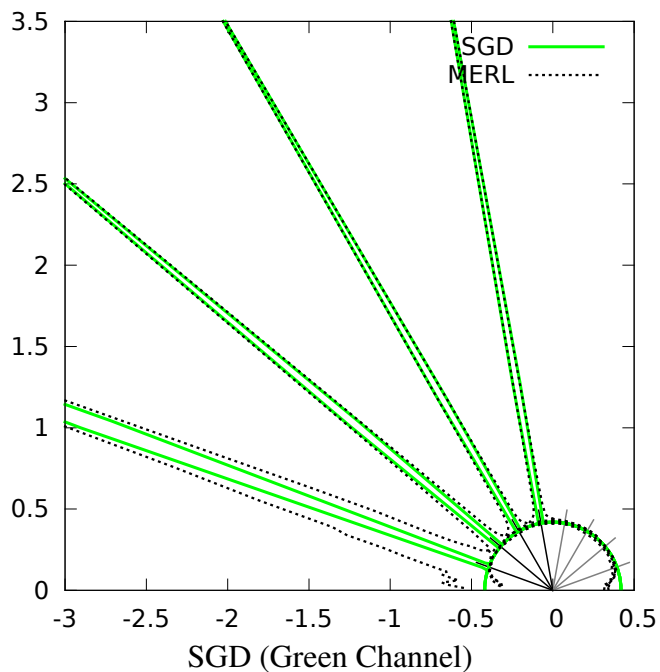
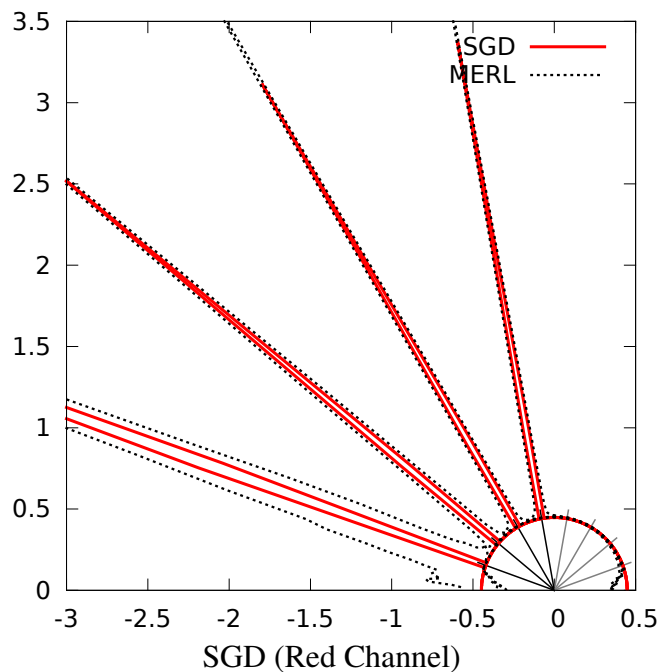
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.282896	0.0678467	2.00918e-05	4.35028e-11	0.0132613	-0.1025	49772.5	0.134616
Green	0.231703	0.0683808	3.22307e-05	0.131903	0.0416359	-0.0828341	28318.4	0.114414
Blue	0.127818	0.032756	9.59333e-05	0.390338	0.285115	0.0759745	7131.79	0.179676

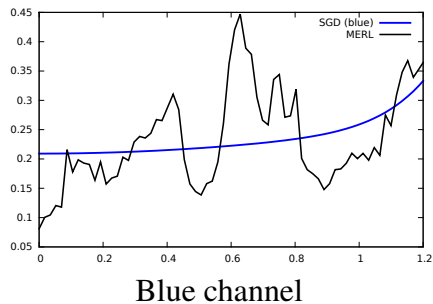
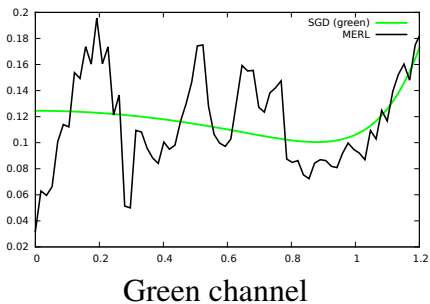
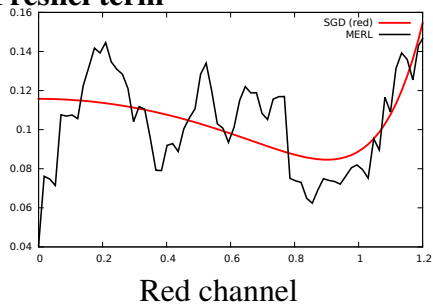
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.58788e+06	4.5813e+06	767.24	0.60999
Green	1.12234e+07	1.00372e+07	646.93	0.61958
Blue	3.05696	6.93295e-08	455.184	0.536789

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *specular-yellow-phenolic*

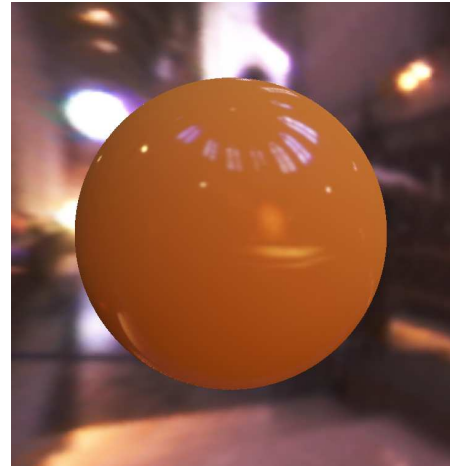
Rendered Images



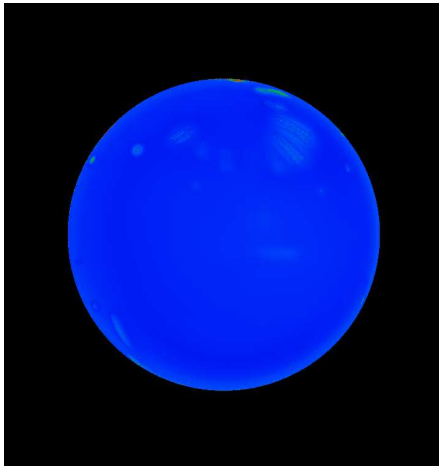
SGD



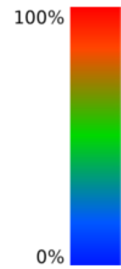
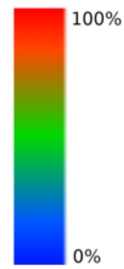
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

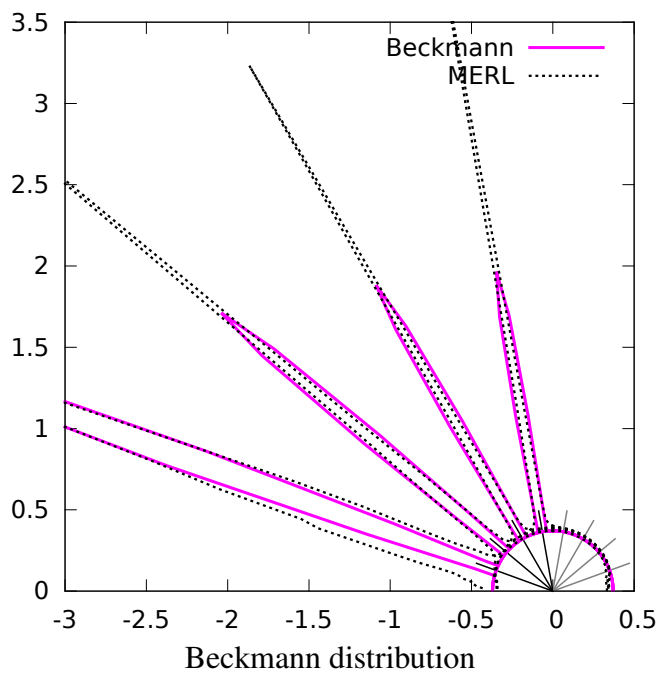
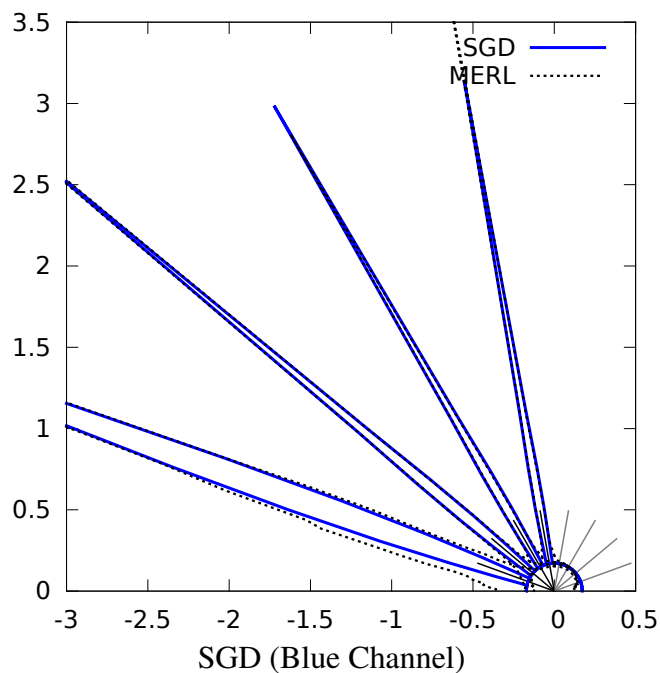
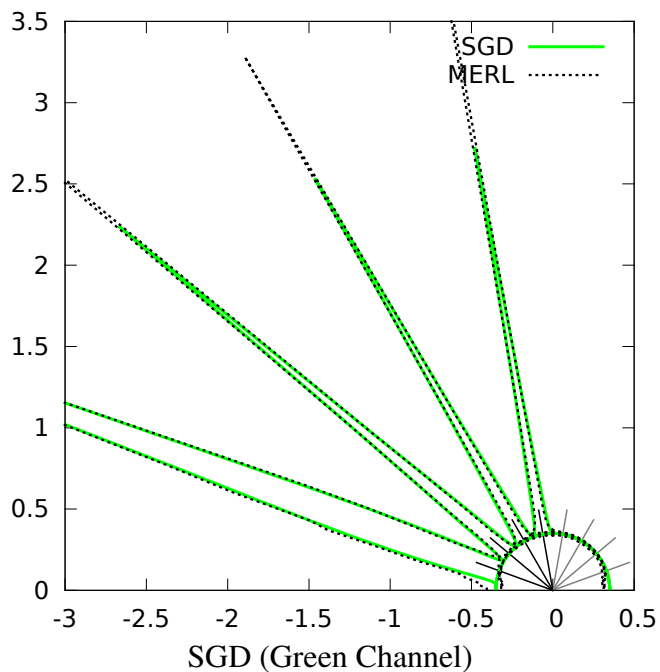
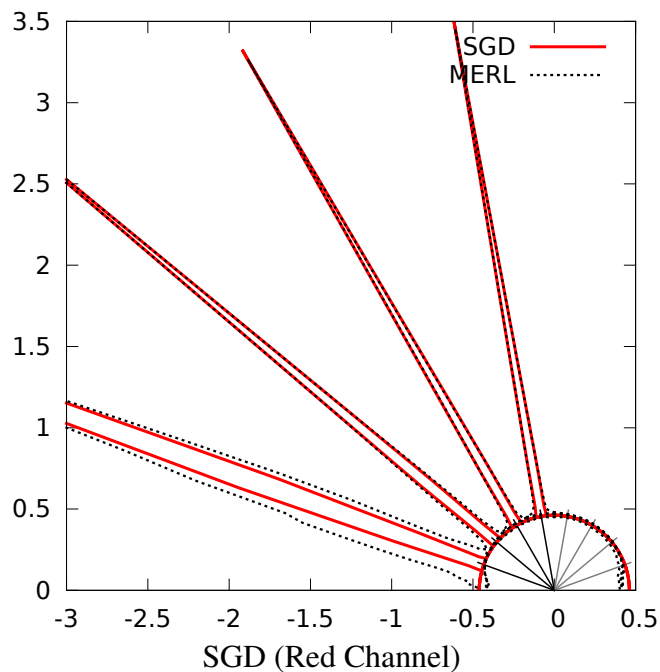
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.309395	0.0607659	0.000200174	0.355381	0.077039	-0.0182146	3597.35	0.0451868
Green	0.135278	0.141526	0.00179326	0.767285	0.0175574	-0.0417745	190.656	0.0491835
Blue	0.0159106	0.110839	0.00048094	0.505029	0.038586	-0.0114057	1192.15	0.031808

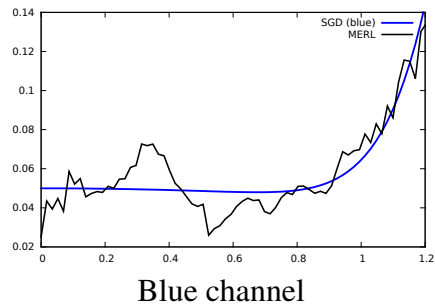
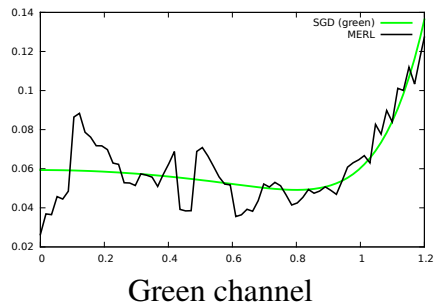
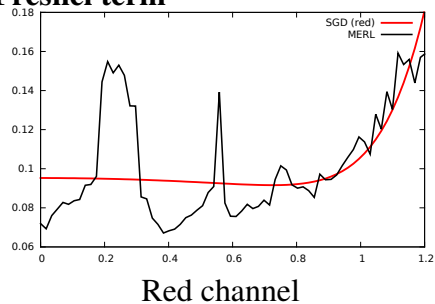
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.80702	1.01181e-07	313.8	0.523001
Green	0.000181166	3.0765e-07	34.1523	-0.0813947
Blue	1.69208	1.27637e-07	221.08	0.500075

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *ss440*

Rendered Images



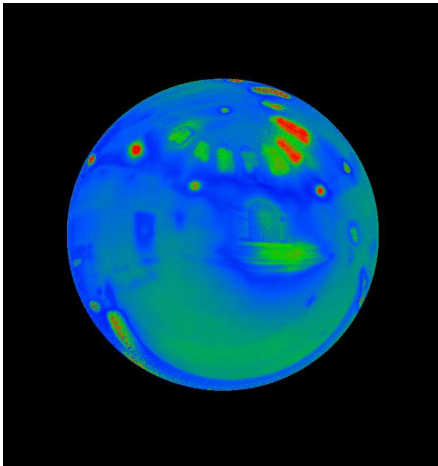
SGD



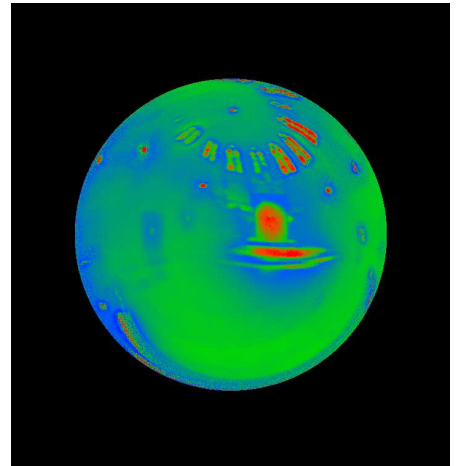
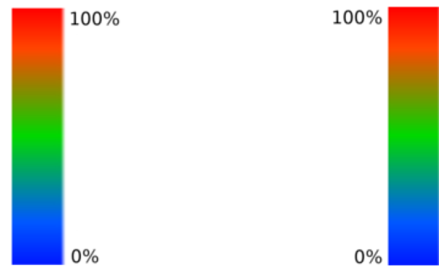
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

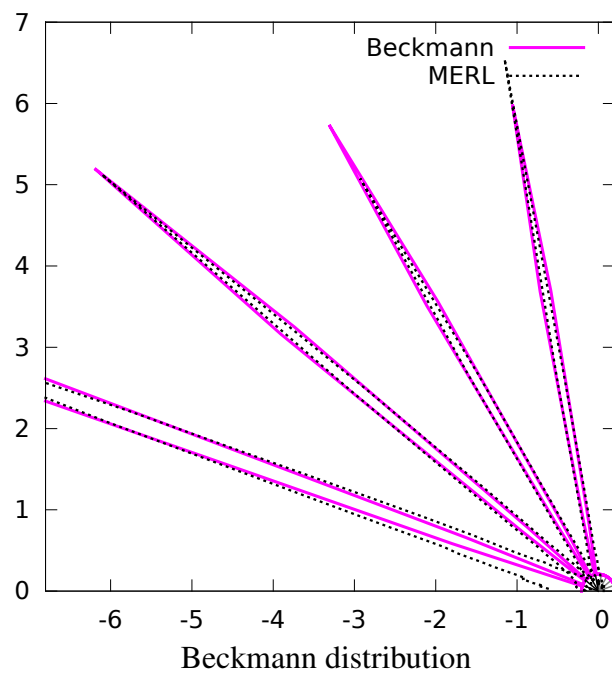
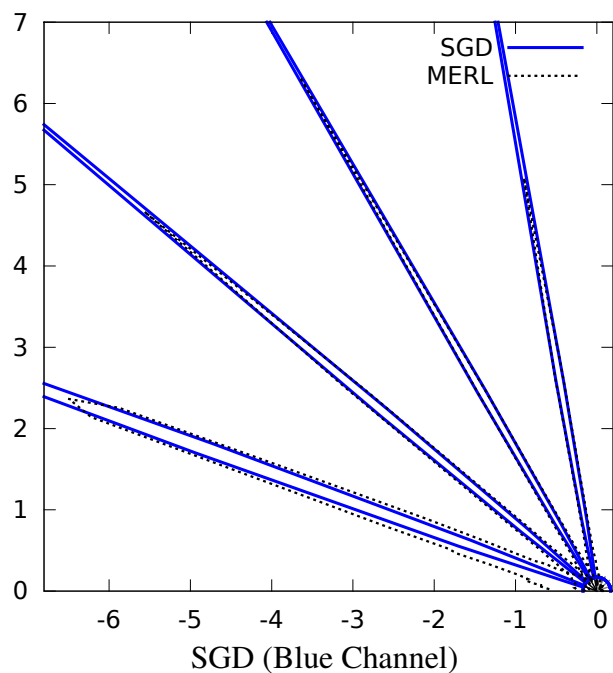
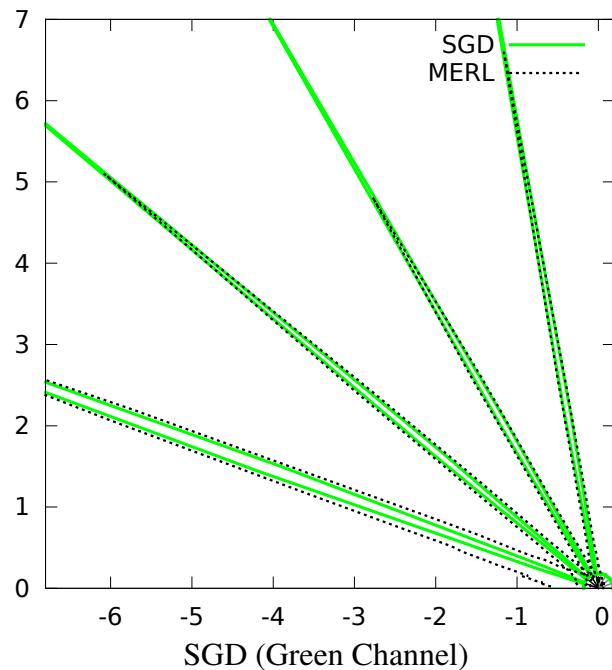
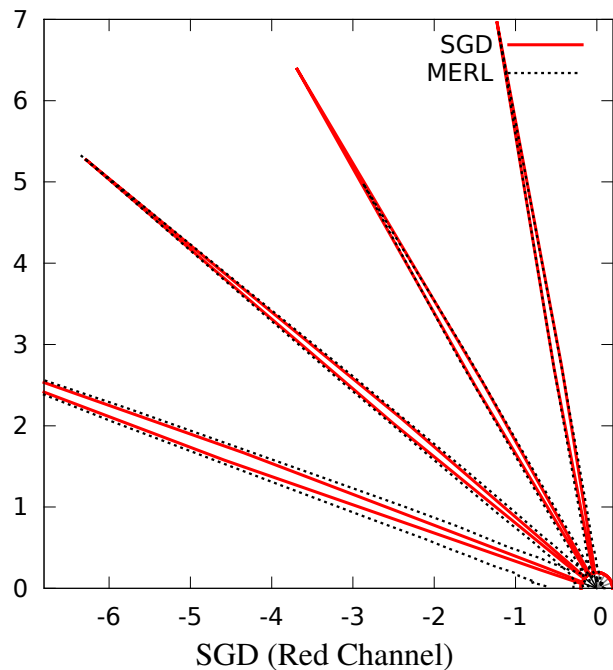
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0229923	0.127809	4.06782e-05	0.0888931	2.26479e-12	-0.474442	23197.8	0.366952
Green	0.0187037	0.14899	4.86278e-05	0.259135	5.7223e-13	-0.223179	16625.7	0.463741
Blue	0.0153204	0.0473376	8.15367e-05	0.332727	0.820577	-0.179423	9083.17	0.874071

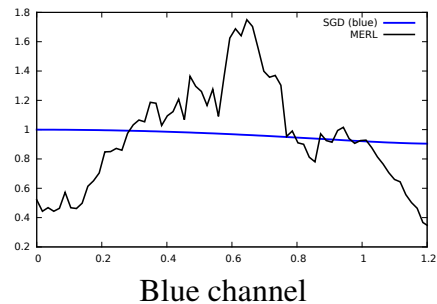
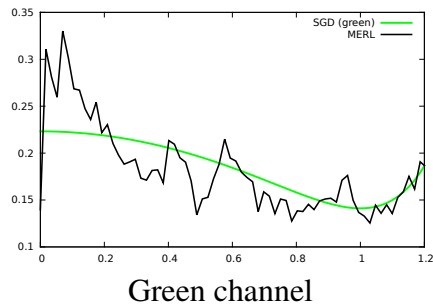
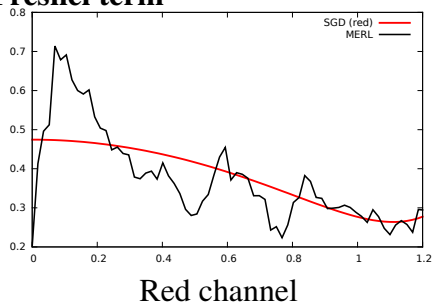
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.43395e+07	1.06287e+07	556.069	0.627834
Green	7.33446	7.92907e+91	215.021	1.20059
Blue	4.46921	9.97795e-08	479.875	0.540075

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *steel*

Rendered Images



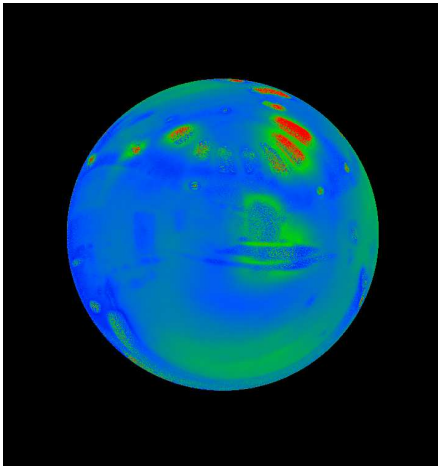
SGD



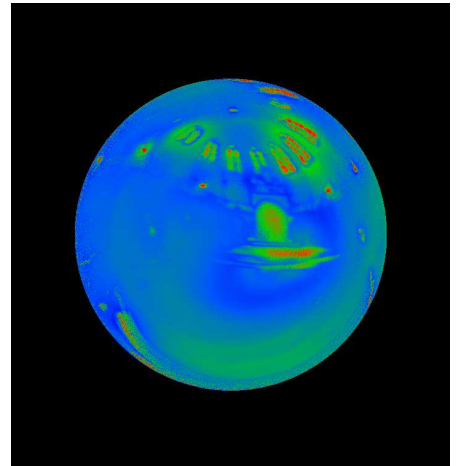
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

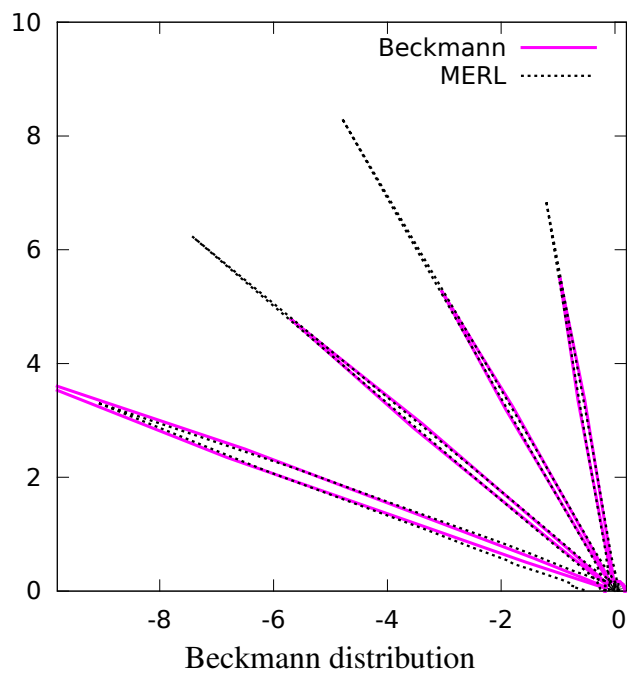
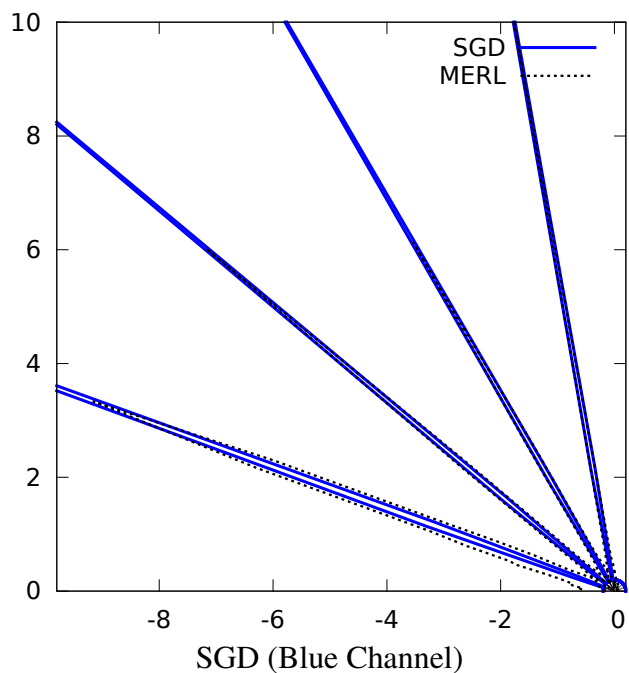
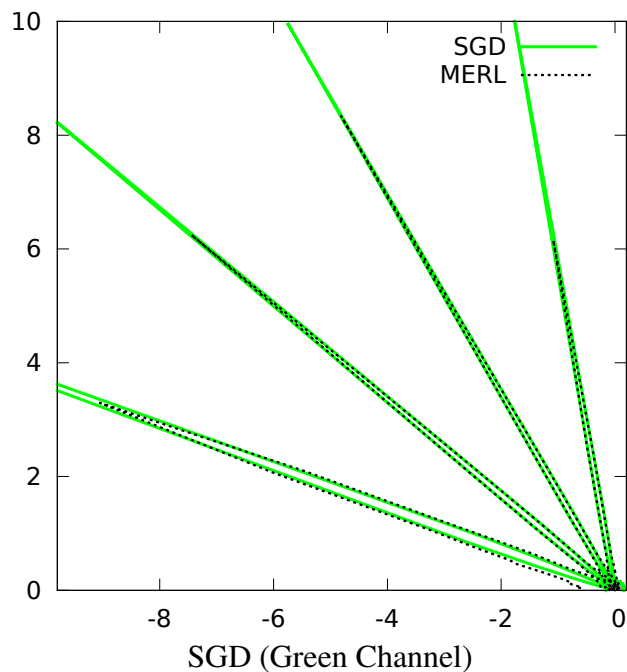
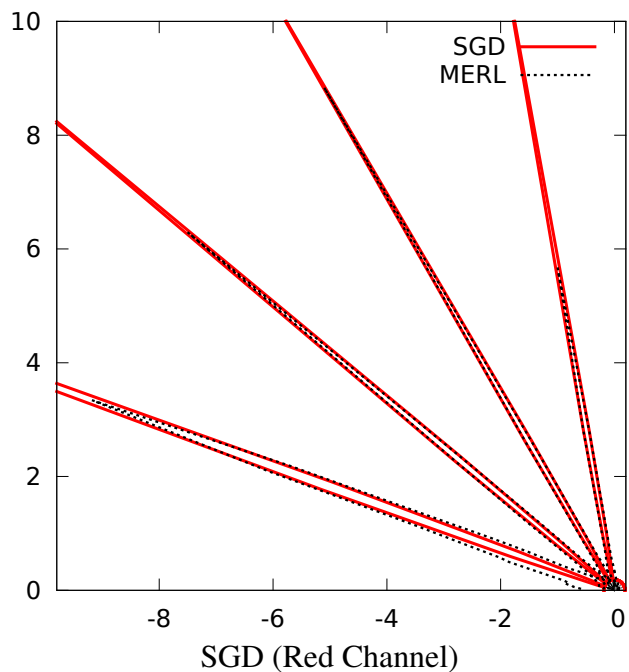
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.019973	0.0615275	8.63865e-05	0.3729	0.665193	-0.334807	8119.74	1.11996
Green	0.0127074	0.0469644	0.000249576	0.583679	0.798139	-0.201861	1951.31	1.28262
Blue	0.0246402	0.0402151	5.77865e-05	0.471406	0.0115189	-0.988481	10374.2	1.42004

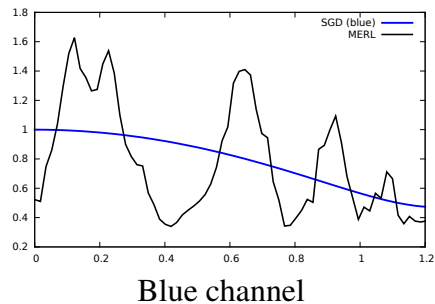
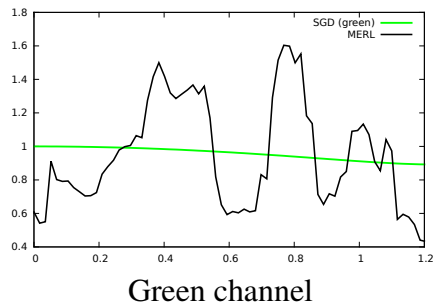
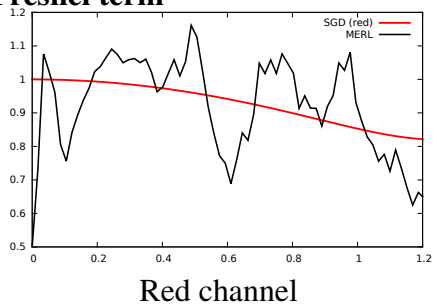
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.40501	1.25096e-07	474.668	0.539696
Green	1.12086	9.51373e-08	313.81	0.519433
Blue	1.88549	1.20412e-07	603.334	0.545491

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

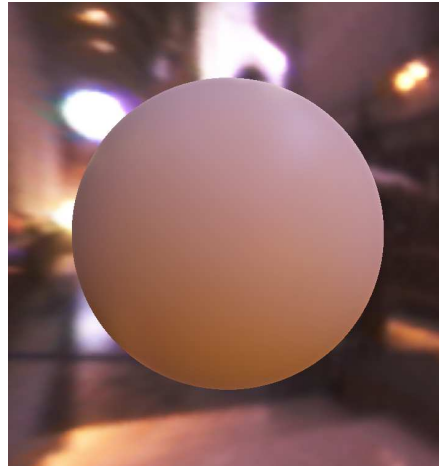


Material Name: *teflon*

Rendered Images



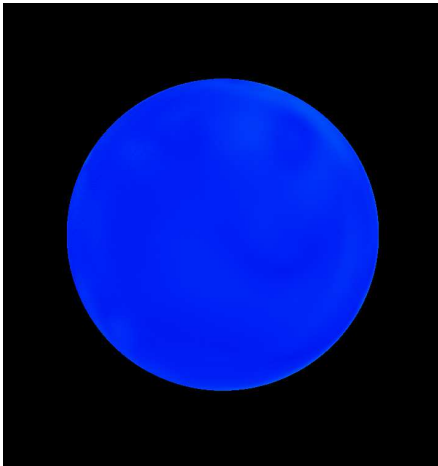
SGD



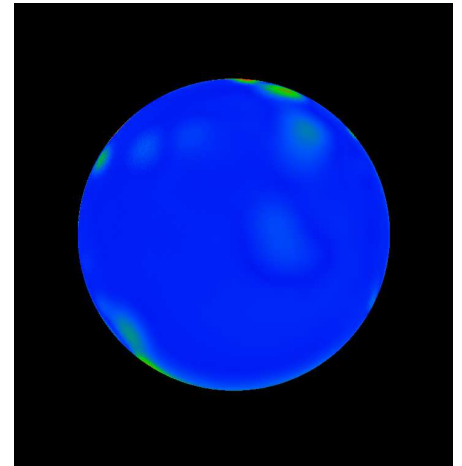
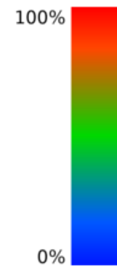
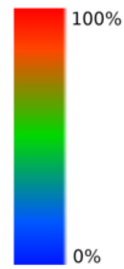
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

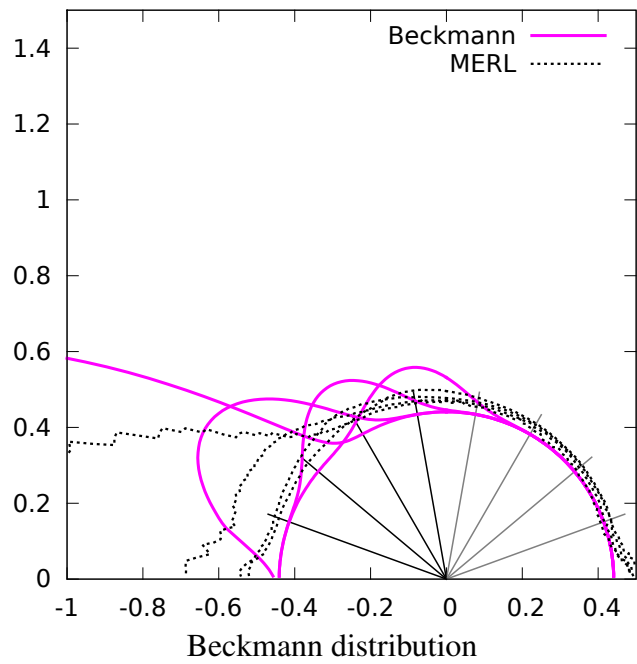
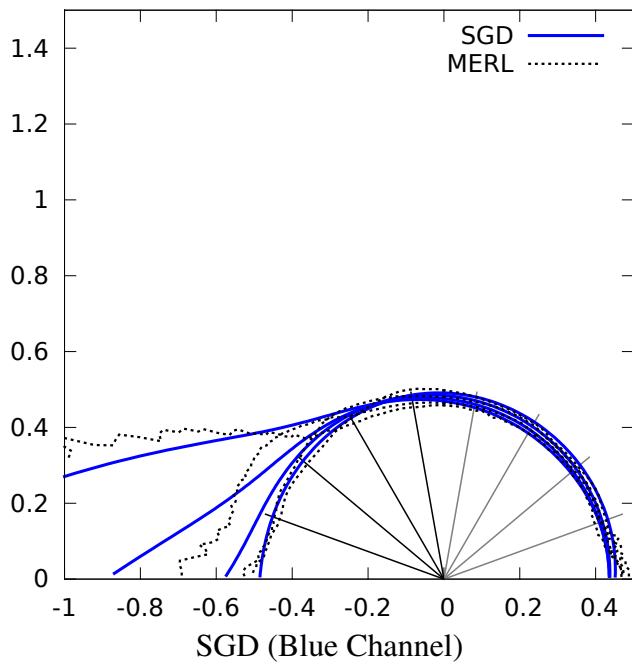
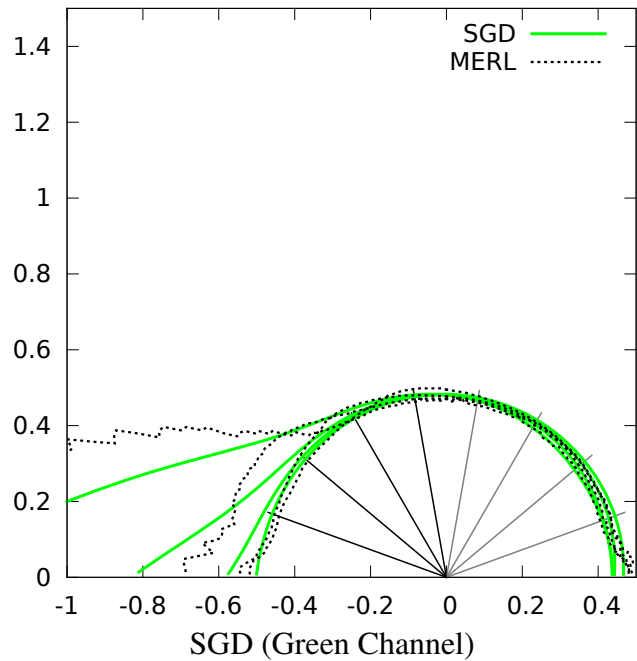
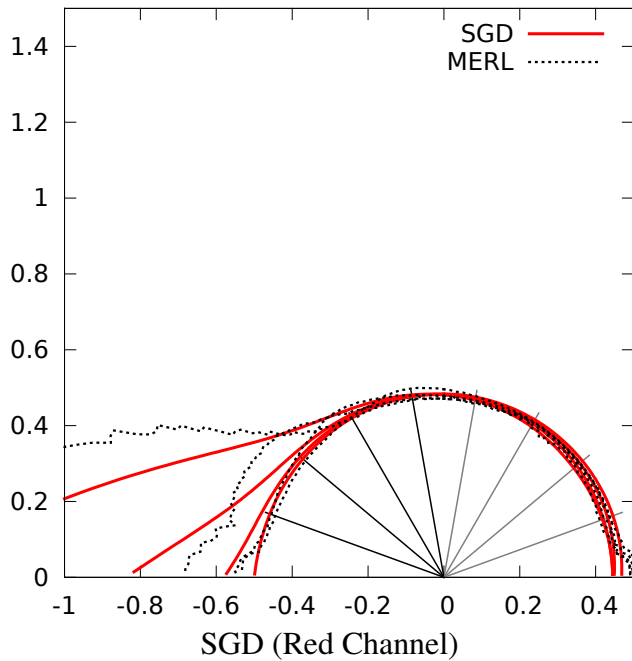
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.276442	1.56924	0.678586	1.2402	9.40662e-13	-0.0492032	3.91532	0.00462131
Green	0.263098	1.52804	0.662167	1.14126	3.57656e-11	-0.0587316	3.82834	0.00463132
Blue	0.260294	1.43859	0.577852	1.44077	1.50208e-11	-0.0548028	3.64944	0.00408386

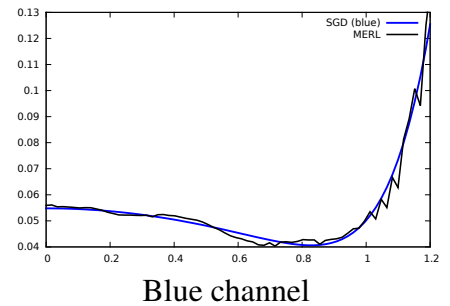
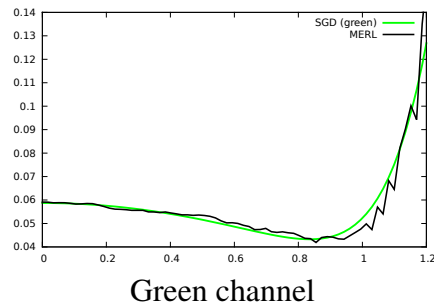
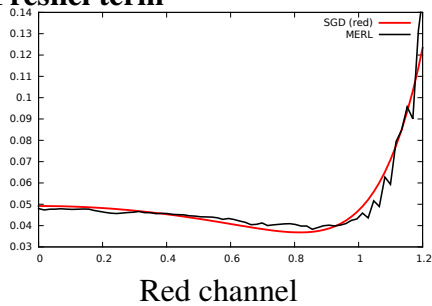
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.09871	0.0378525	6.8689	0.166634
Green	2.05044	0.0435869	6.72229	0.181605
Blue	2.90315	0.0028469	9.65585	-0.0468321

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *tungsten-carbide*

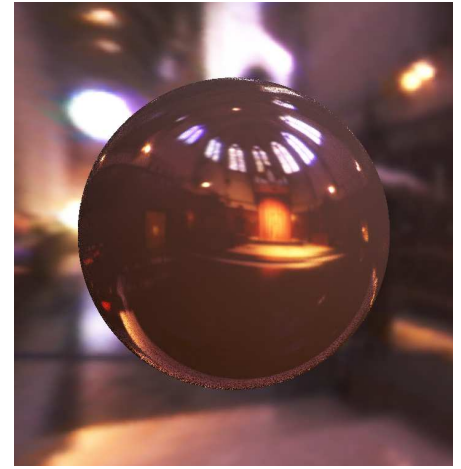
Rendered Images



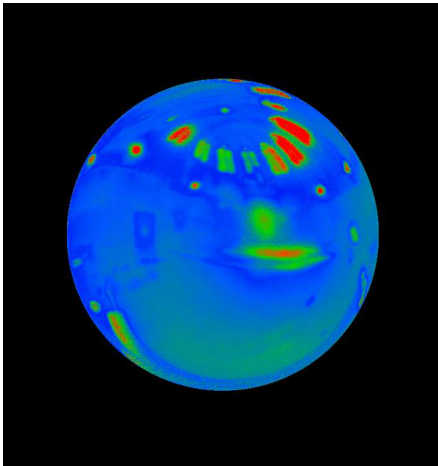
SGD



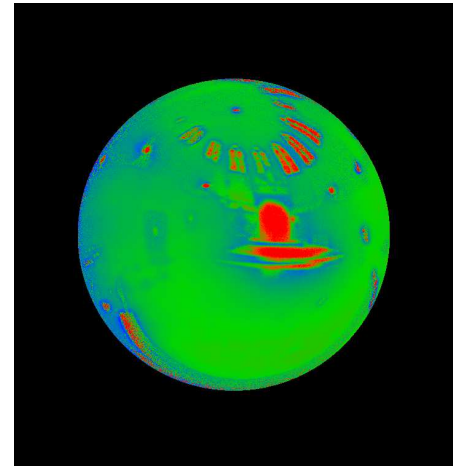
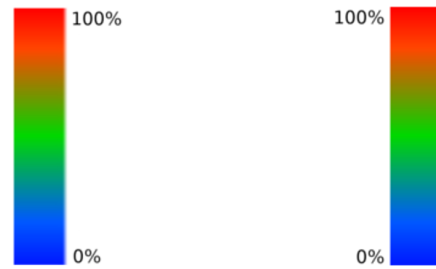
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

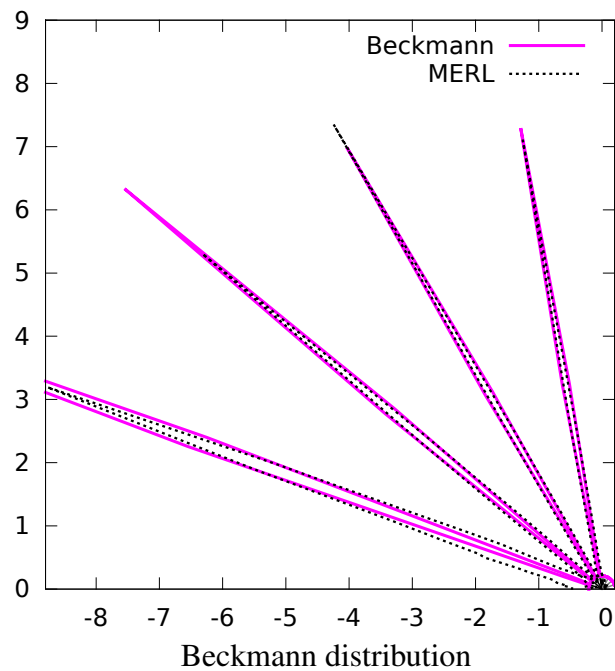
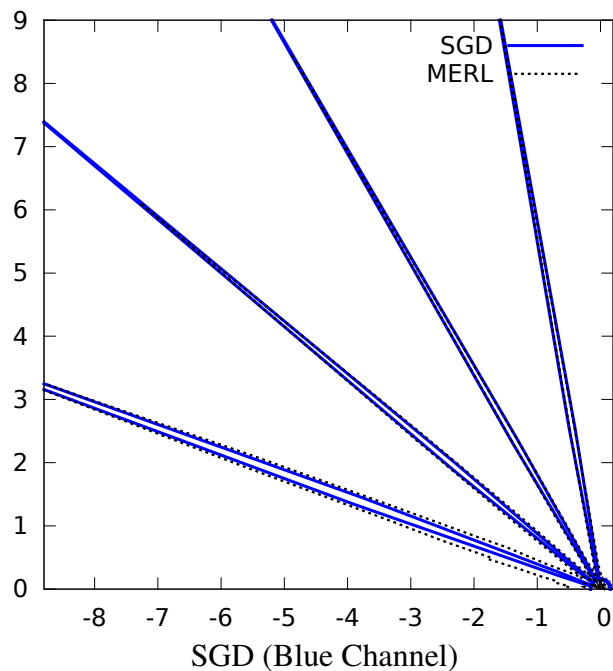
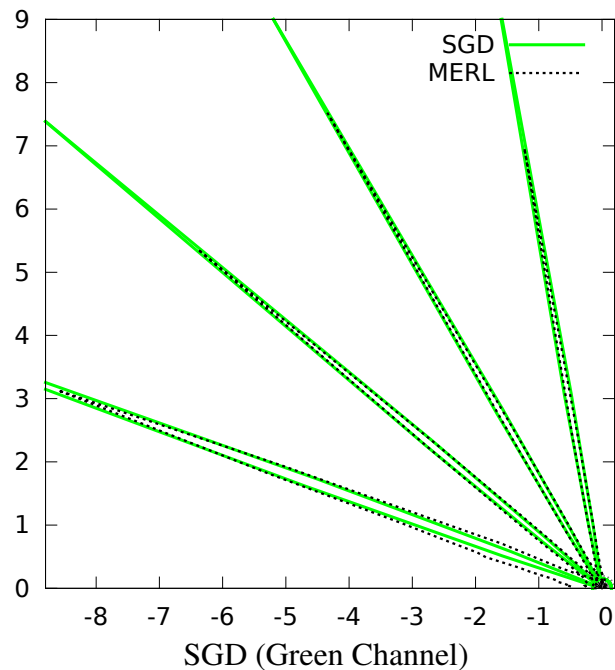
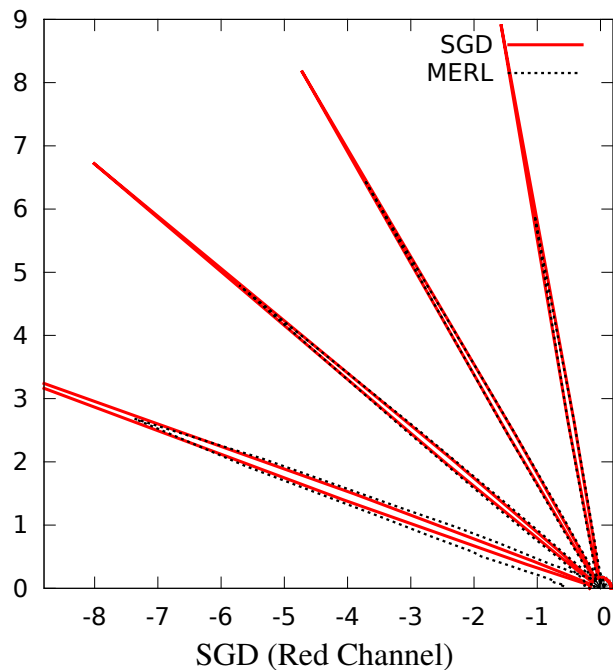
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0151872	0.0504358	6.6122e-05	0.255291	5.30357e-14	-1	12280.7	0.472021
Green	0.0103016	0.075701	7.65809e-05	0.270824	5.44537e-12	-1	10423.3	0.583364
Blue	0.0123192	0.0556673	4.80196e-05	0.26732	1.09586e-11	-1	16683.5	0.850304

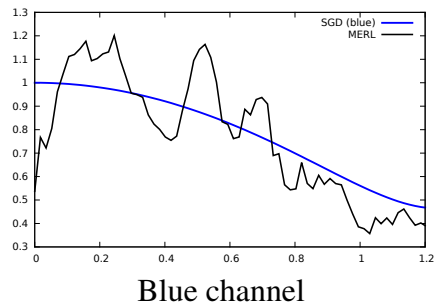
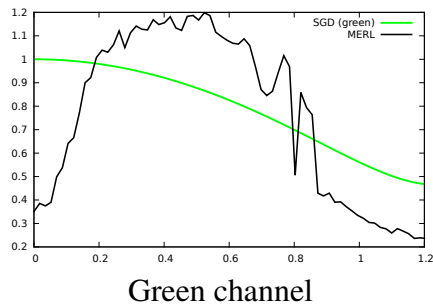
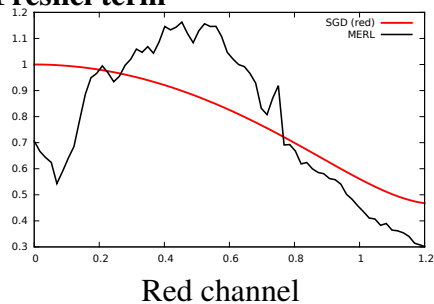
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	7.42976	2.69581e+78	185.623	1.197
Green	6.36068	1.90426e+73	173.962	1.19586
Blue	6.81602	6.81451e+92	218.975	1.19745

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *two-layer-gold*

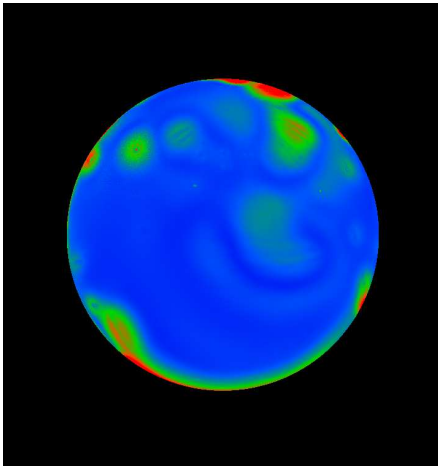
Rendered Images



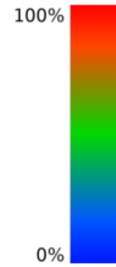
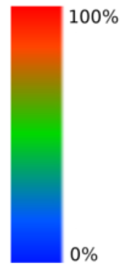
SGD



Reference



SGD (Lab difference)



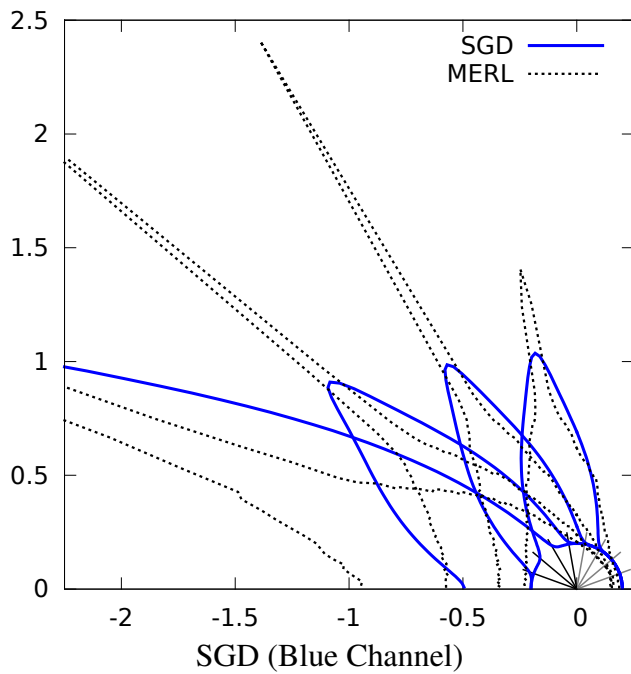
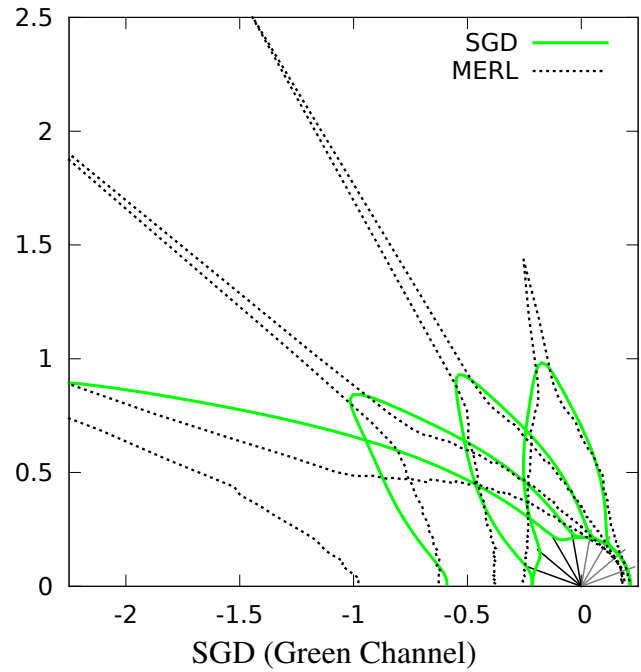
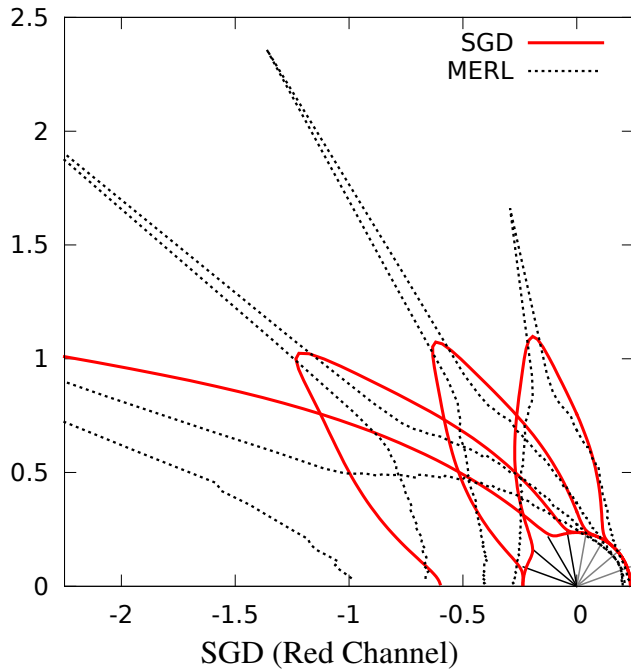
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0415046	1.58161	0.0263104	0.355682	0.117355	0.0411678	30.4478	0.165383
Green	0.0312801	1.18736	0.0293804	0.354281	0.0614942	-0.0237579	27.5367	0.160769
Blue	0.0253658	1.63847	0.0241265	0.36415	0.0447004	-0.0100488	32.7278	0.168742

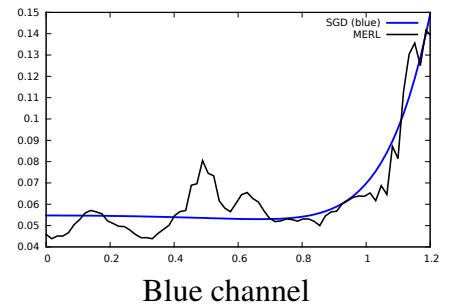
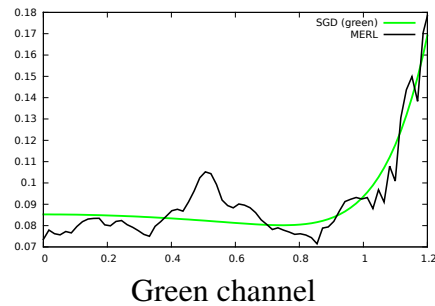
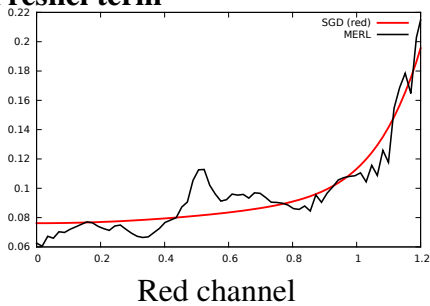
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.91606	9.38513e-08	36.9091	0.0815181
Green	3.99968	6.62806e-08	35.6578	0.0465613
Blue	3.79114	6.79906e-08	38.4915	0.0922721

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *two-layer-silver*

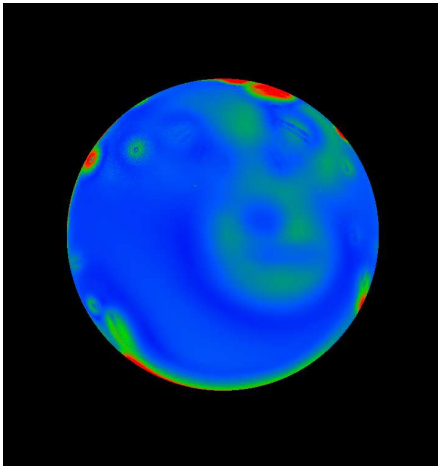
Rendered Images



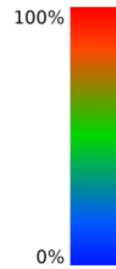
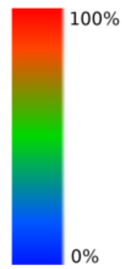
SGD



Reference



SGD (Lab difference)



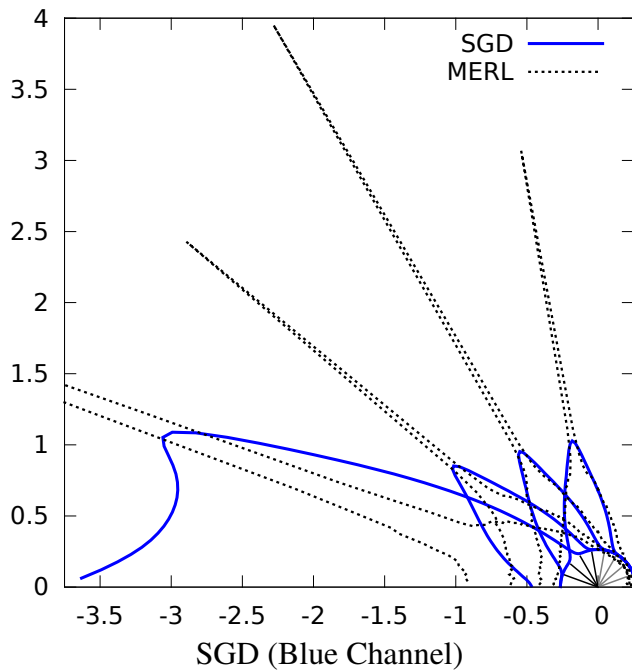
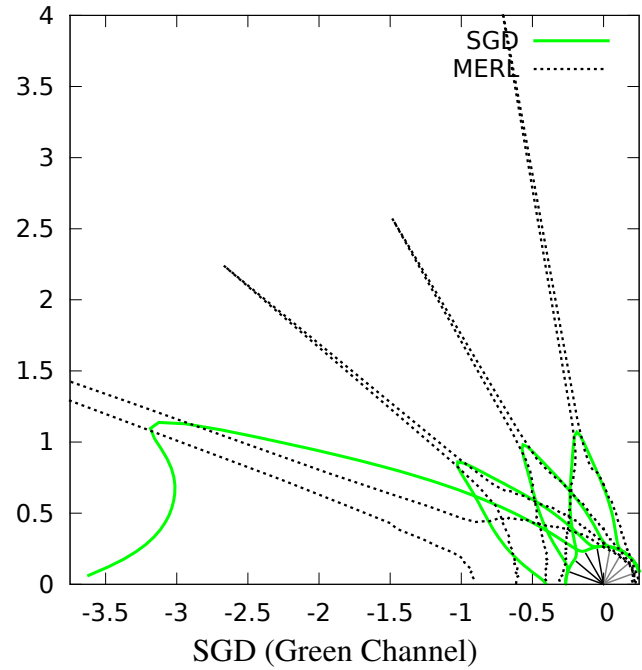
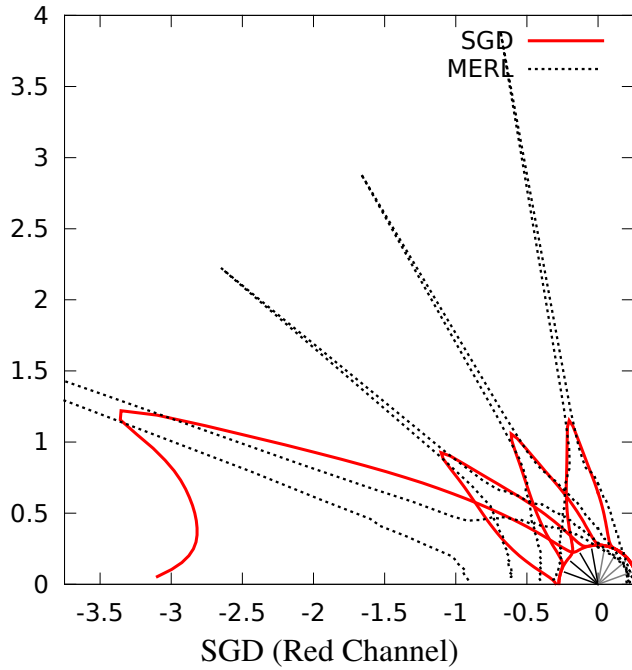
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0657916	1.55275	0.0149977	0.382631	4.93242e-13	-0.0401315	50.1263	0.170639
Green	0.0595705	2.00145	0.0201665	0.35975	1.00098e-14	-0.0395054	38.8508	0.189329
Blue	0.0581288	1.93045	0.0225062	0.361657	0.0103259	-0.0312454	34.9978	0.21468

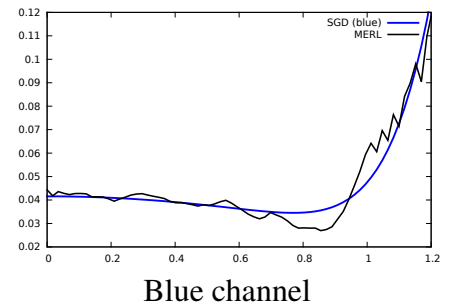
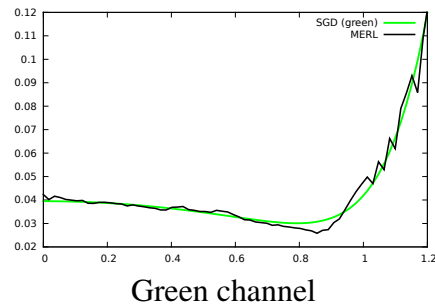
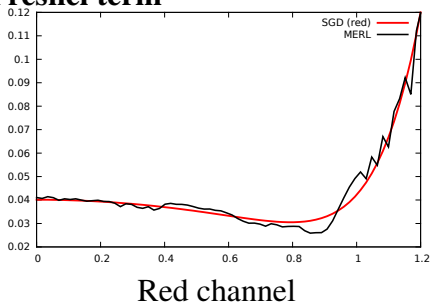
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	3.41873	6.09709e-08	46.6236	0.183797
Green	3.77545	1.02036e-07	40.8229	0.139103
Blue	3.78138	1.01016e-07	39.1812	0.117092

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *violet-acrylic*

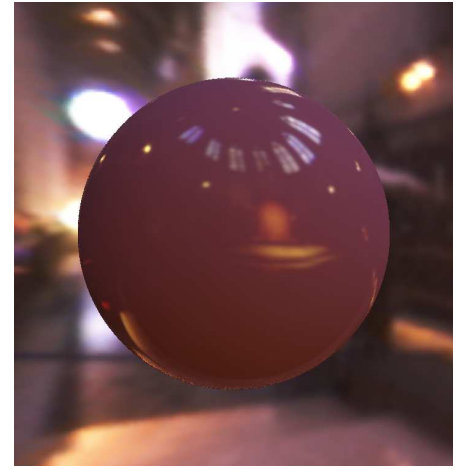
Rendered Images



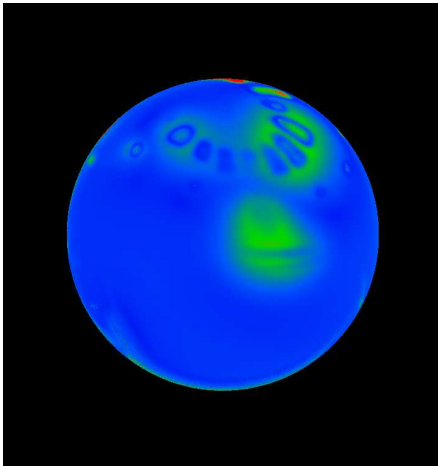
SGD



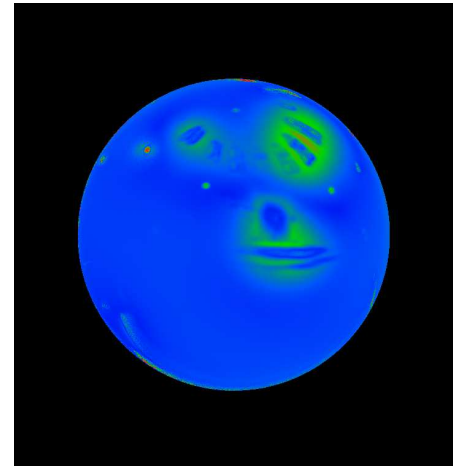
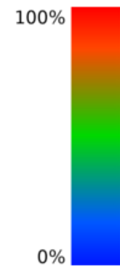
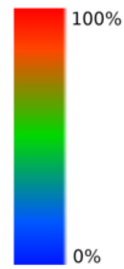
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

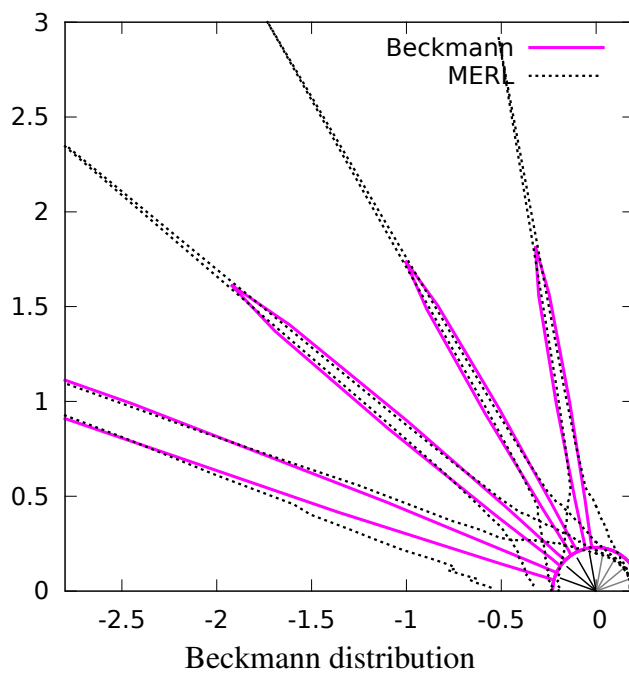
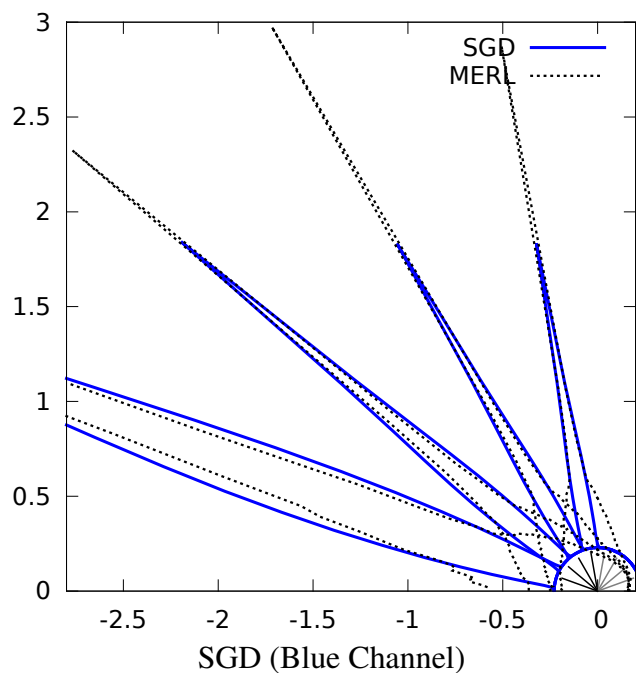
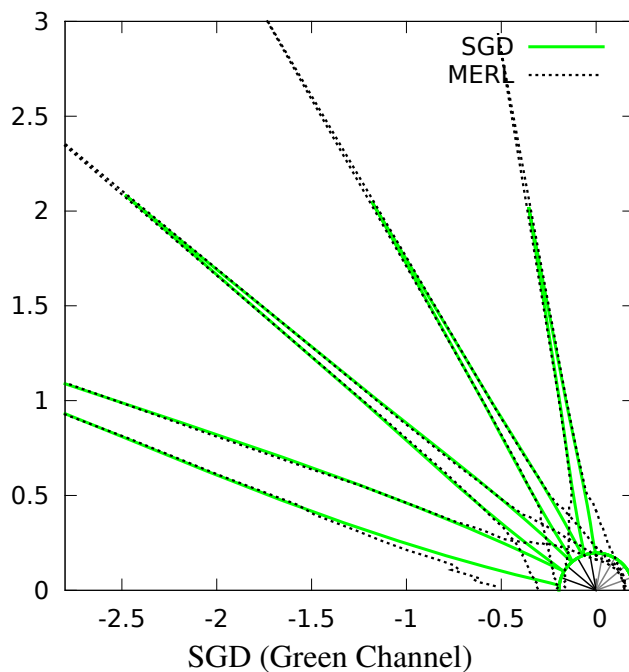
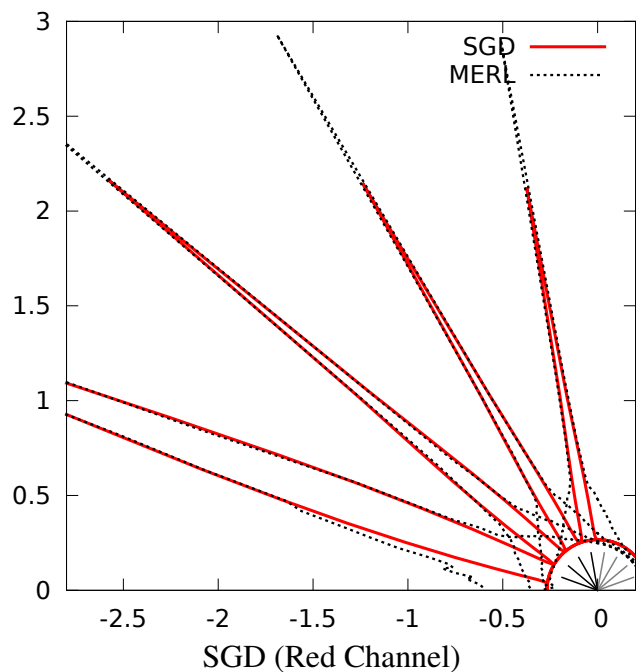
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.0599875	0.134984	0.0011295	0.523244	0.100325	0.0603016	498.715	0.041711
Green	0.023817	0.13337	0.00126481	0.551606	0.0939057	0.0579001	424.307	0.0411698
Blue	0.0379025	0.295509	0.00186818	0.478149	0.0663939	0.0353439	328.834	0.0691096

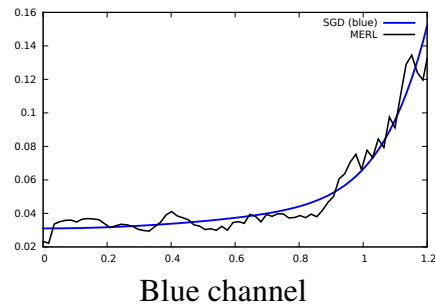
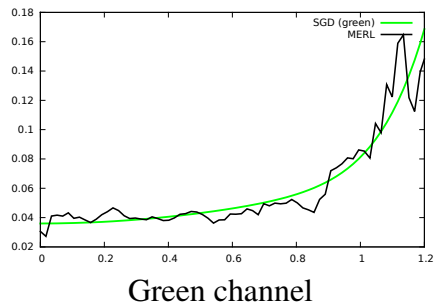
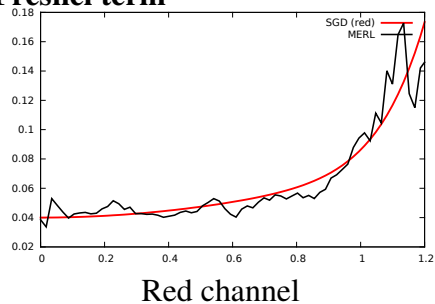
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.79917e-07	4.27008e-07	23.5924	-0.515008
Green	1.39397e-06	3.4655e-07	24.3831	-0.476979
Blue	2.03376	1.05578e-07	116.7	0.432199

BRDF lobes in the incidence plane (Cubic root applied)

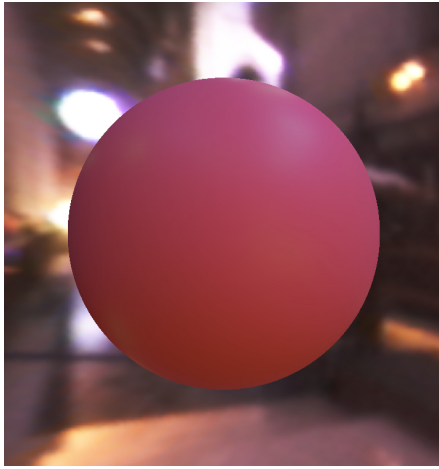


Fresnel term



Material Name: *violet-rubber*

Rendered Images



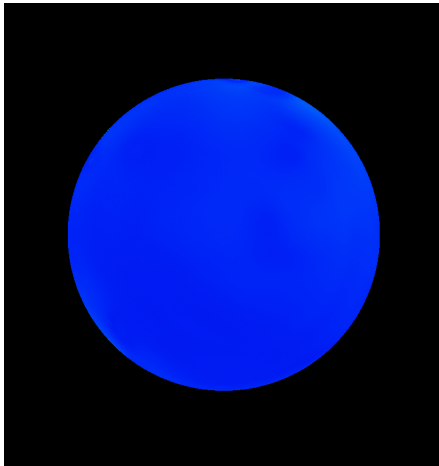
SGD



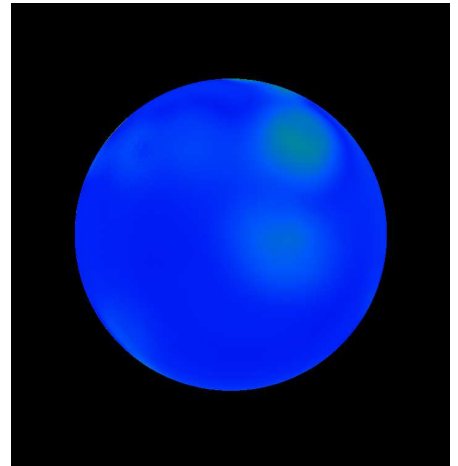
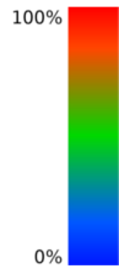
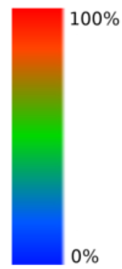
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

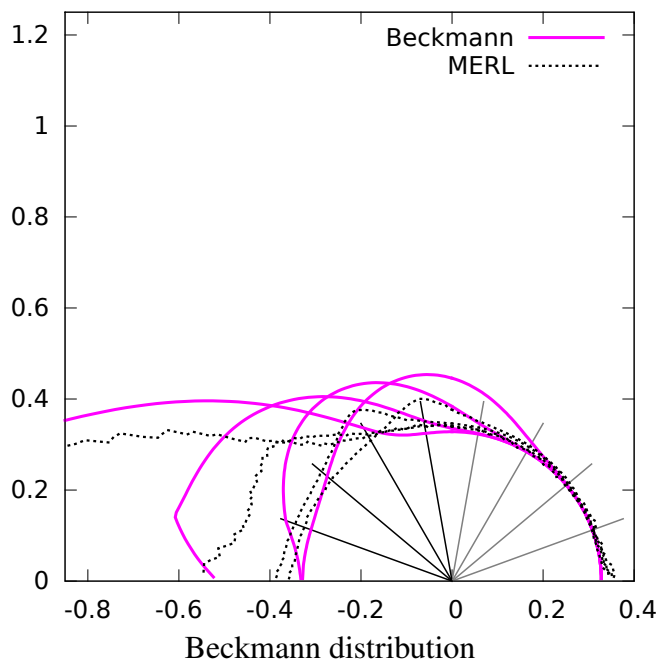
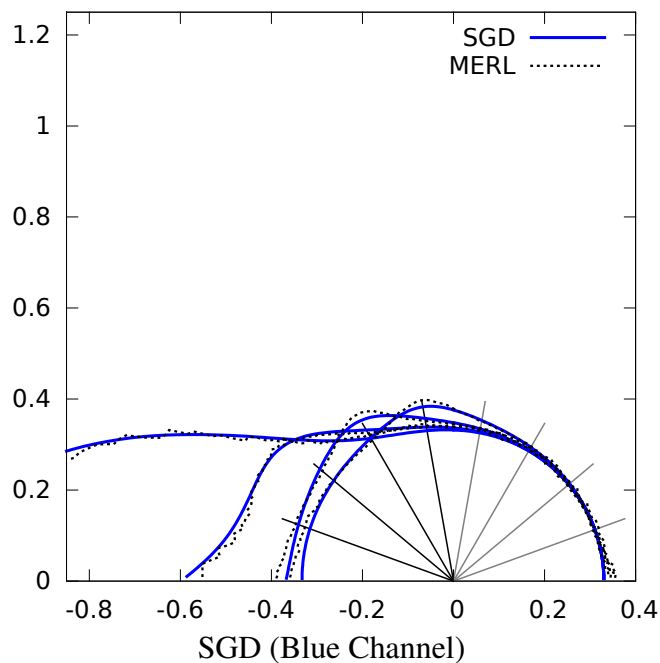
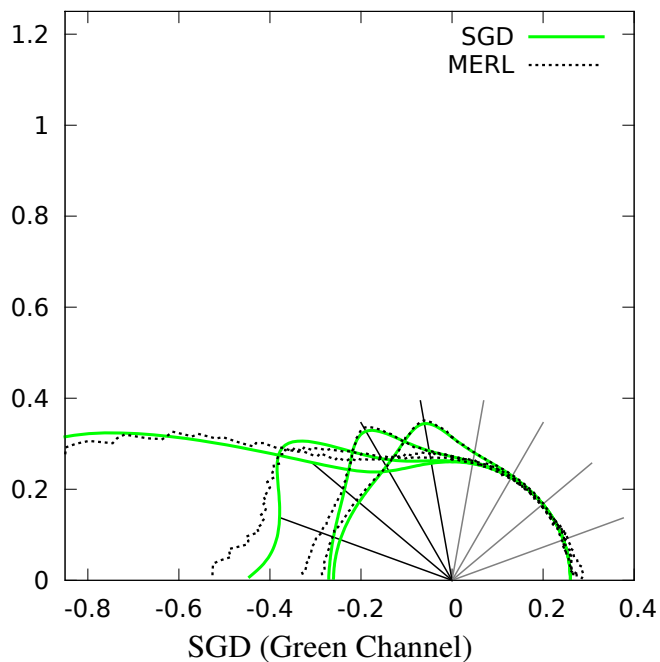
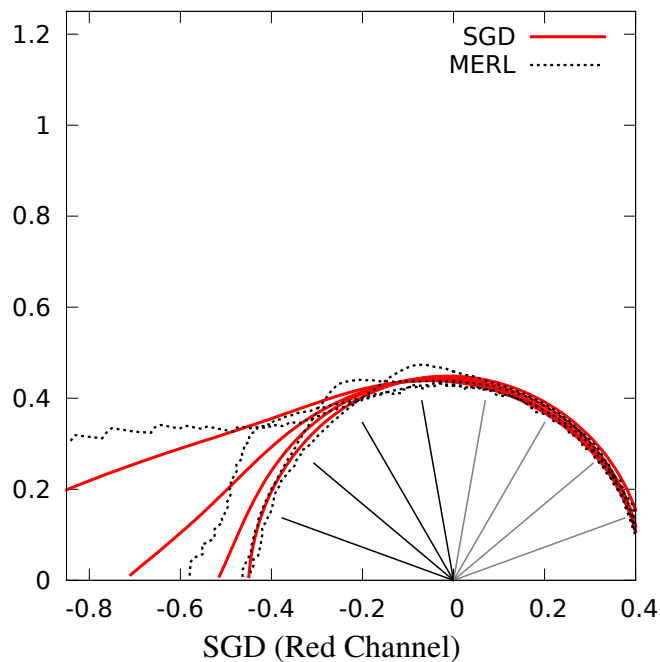
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.223179	0.547456	0.445092	0.923481	0.0518927	-0.0208955	3.58673	0.00274248
Green	0.0553634	0.0966027	0.089421	0.782897	0.113508	0.0585063	7.33539	0.000994259
Blue	0.113238	0.185463	0.1543	0.800907	0.094549	0.036751	5.24404	0.00101746

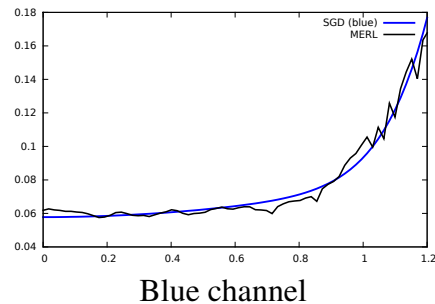
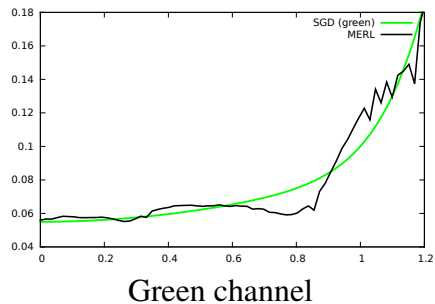
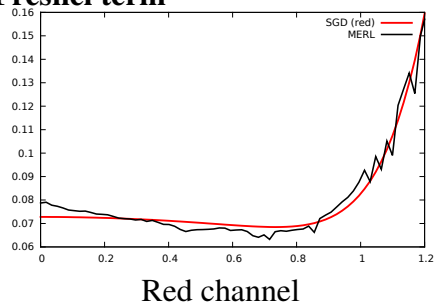
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.83007	0.00374266	9.67534	-0.0037936
Green	2.27788	9.65628e-08	27.1898	-0.174481
Blue	3.00009	1.13746e-07	22.3519	-0.363226

BRDF lobes in the incidence plane (Cubic root applied)

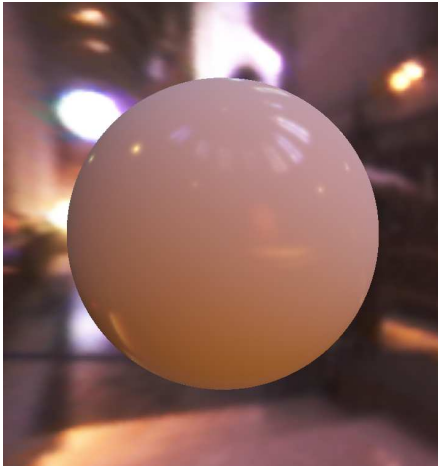


Fresnel term

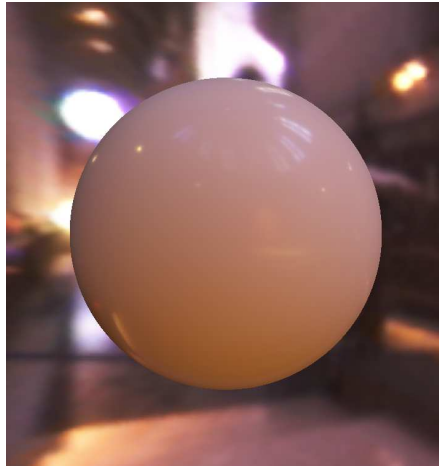


Material Name: *white-acrylic*

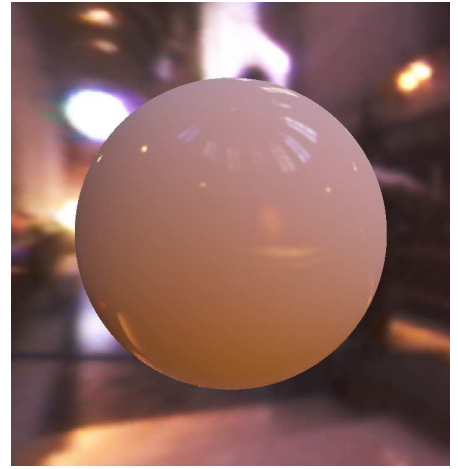
Rendered Images



SGD



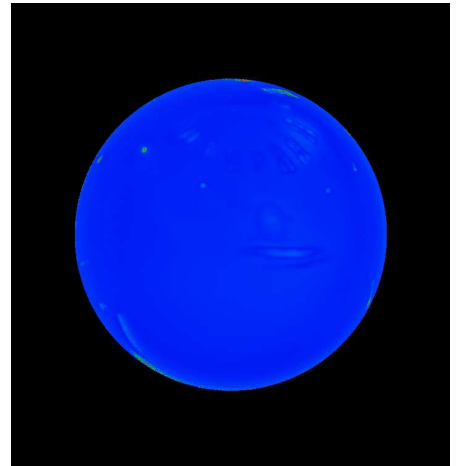
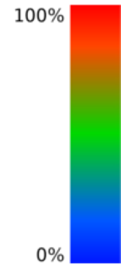
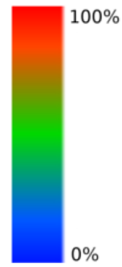
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

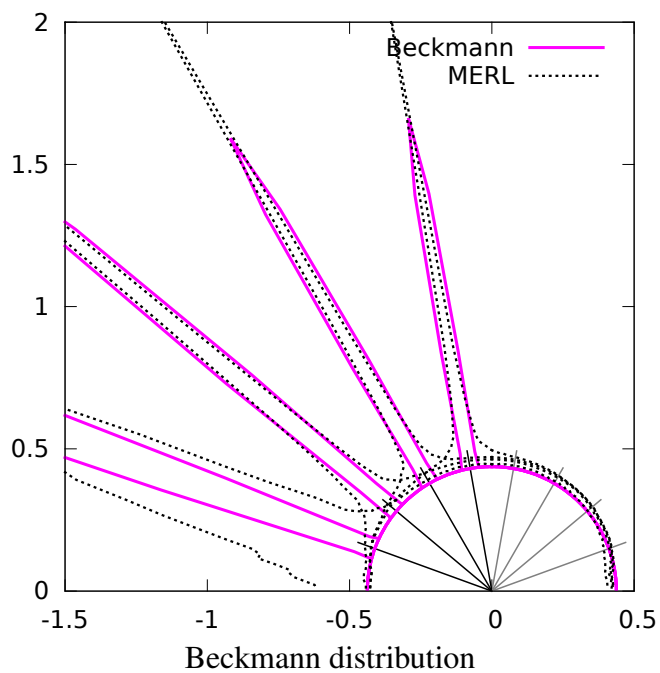
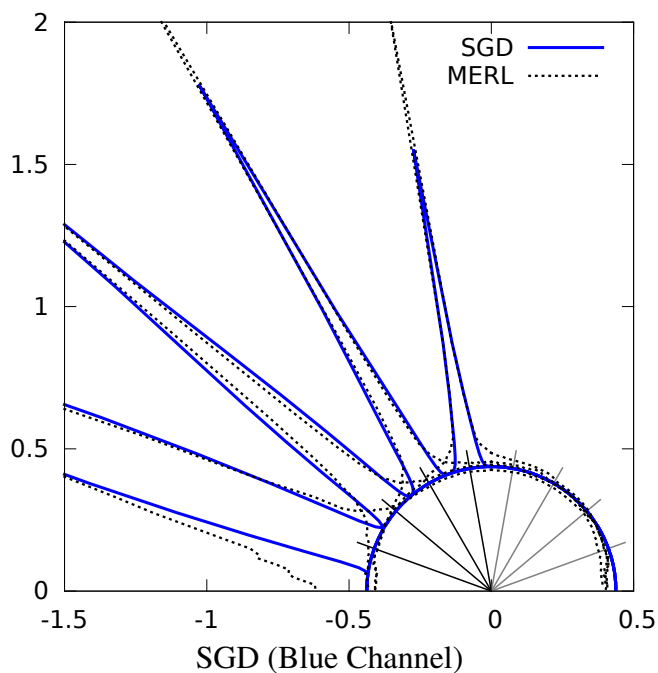
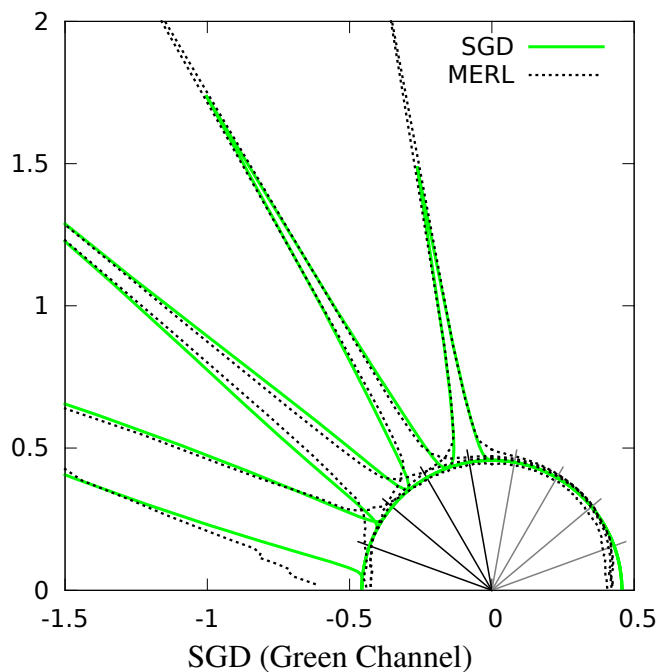
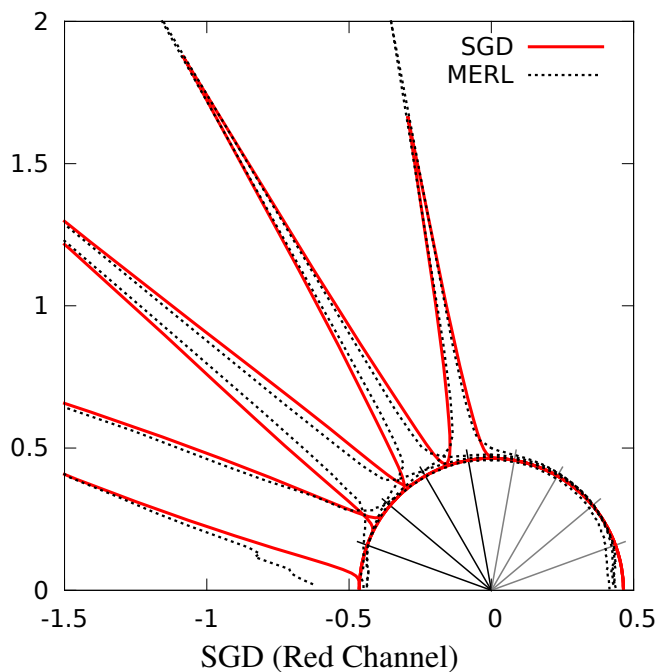
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.314106	0.015339	0.00233914	0.570501	2.651	2.27139	226.134	0.0537471
Green	0.300008	0.0736169	0.00168956	0.51337	0.38473	0.341493	342.423	0.0401864
Blue	0.263648	0.0976209	0.00117717	0.440543	0.249988	0.218093	548.396	0.0400114

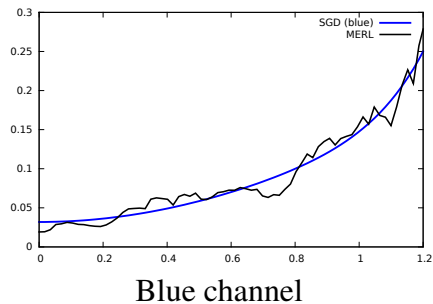
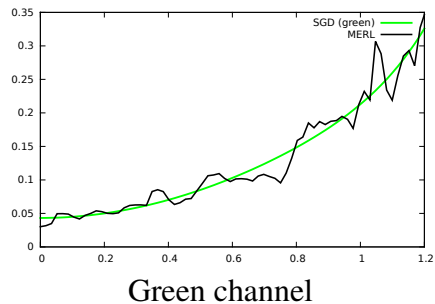
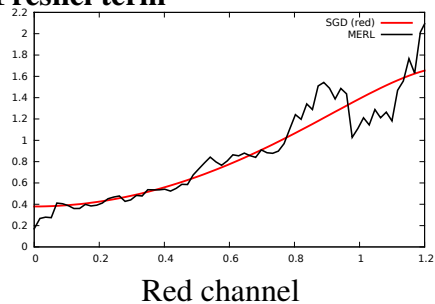
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.41218	9.83895e-08	110.209	0.419684
Green	2.17179e-07	5.84338e-06	18.8595	-0.61884
Blue	4.52325e-08	15.7173	8.78916	0.56243

BRDF lobes in the incidence plane (Cubic root applied)

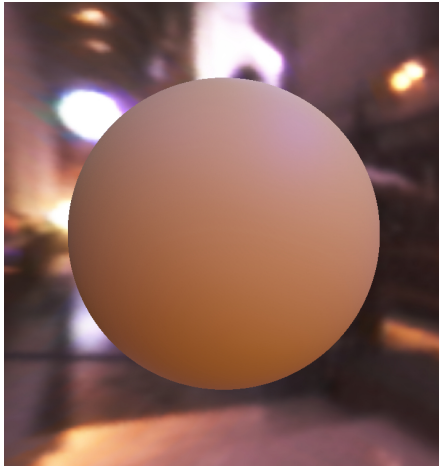


Fresnel term



Material Name: *white-diffuse-bball*

Rendered Images



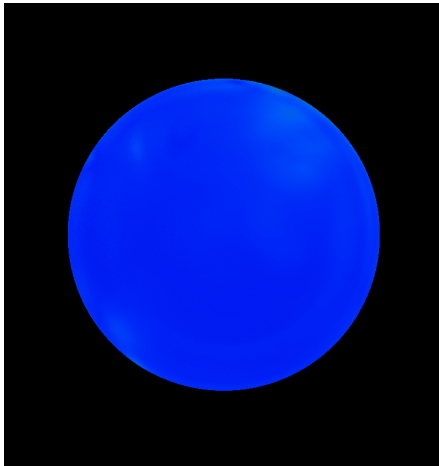
SGD



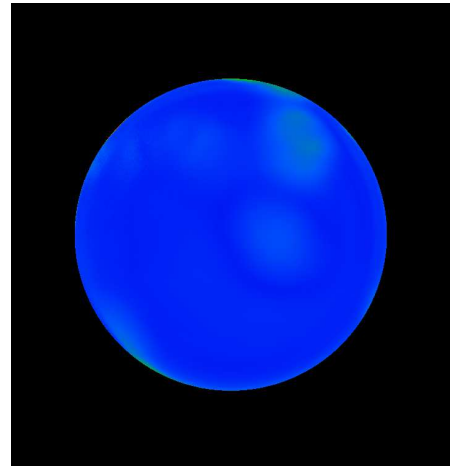
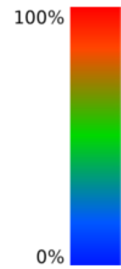
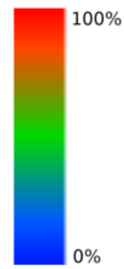
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

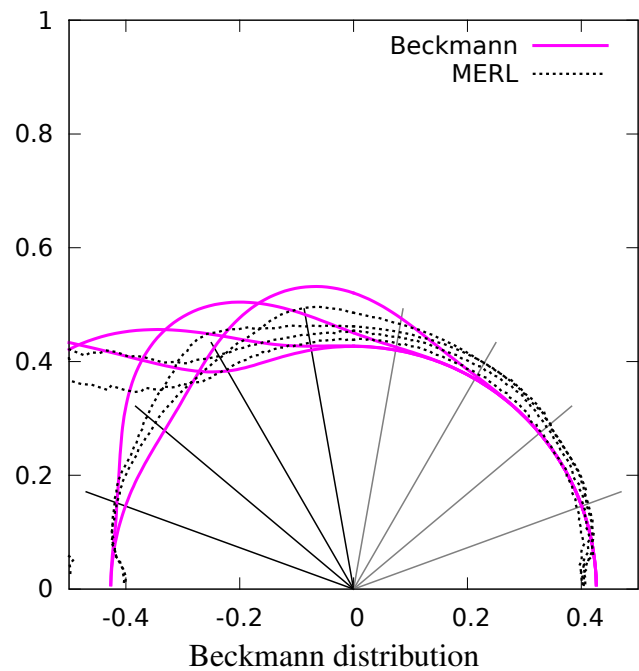
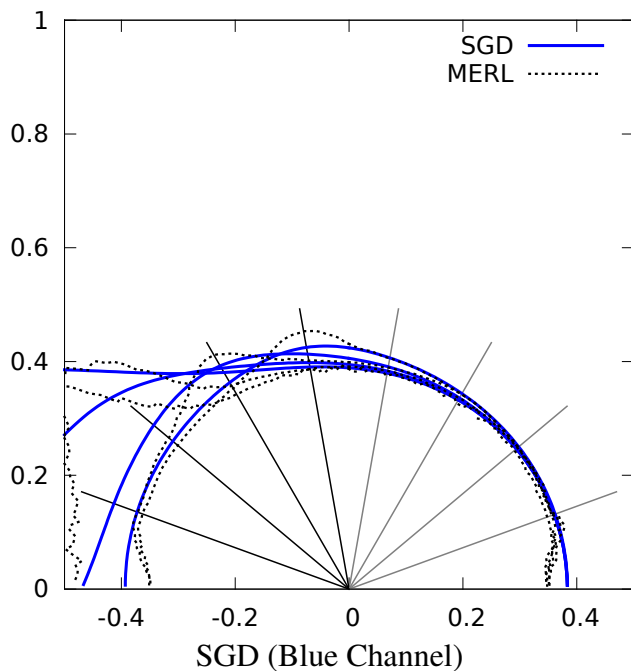
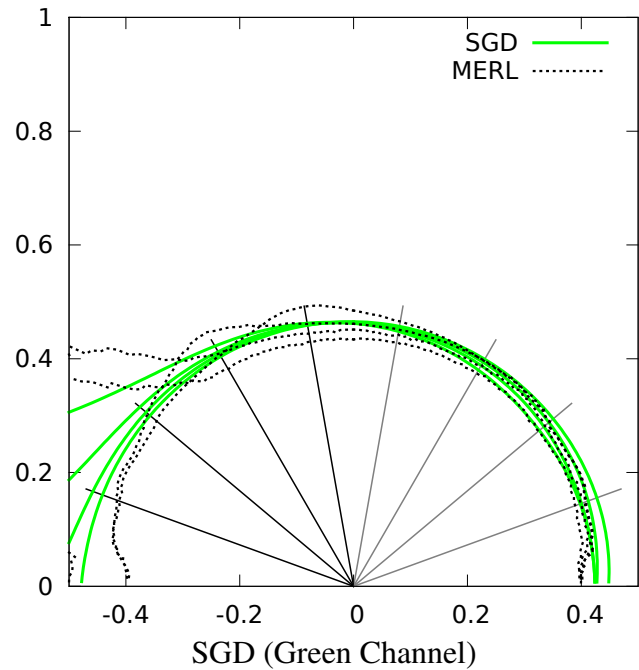
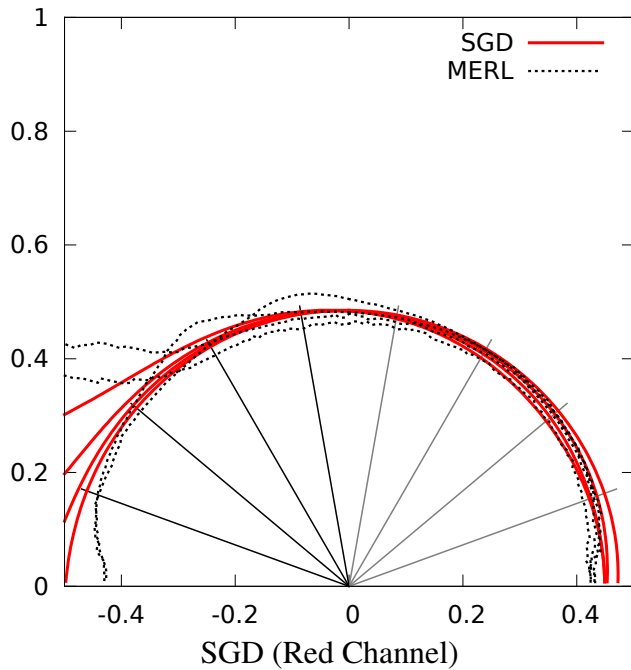
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.284726	0.680658	0.689731	1.23085	1.06465e-11	-0.109723	3.94153	0.007671
Green	0.239199	0.828508	0.601478	0.956833	7.45307e-19	-0.090129	3.65714	0.0072205
Blue	0.177227	0.502128	0.209084	0.800488	0.089058	0.0545089	4.53186	0.00441788

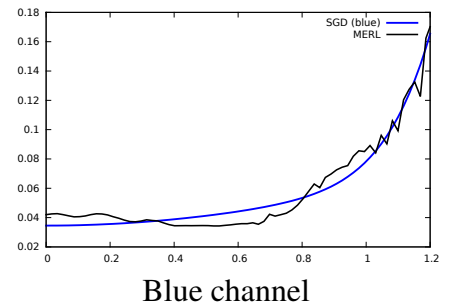
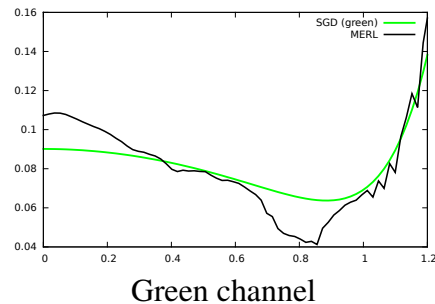
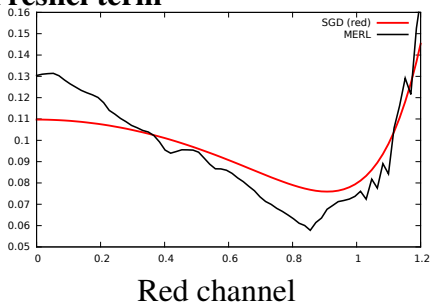
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.04845	0.0434345	6.69695	0.178983
Green	2.06125	0.0439287	6.79535	0.18898
Blue	3.72838	1.06879e-07	20.1466	-0.494774

BRDF lobes in the incidence plane (Cubic root applied)

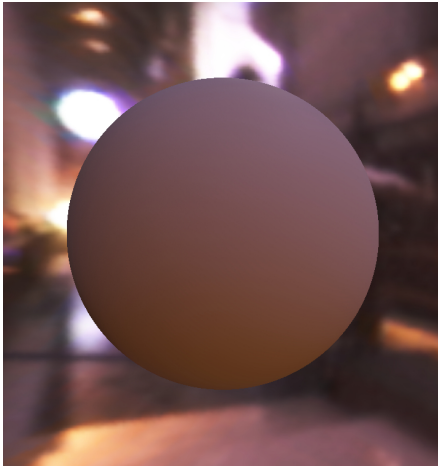


Fresnel term



Material Name: *white-fabric2*

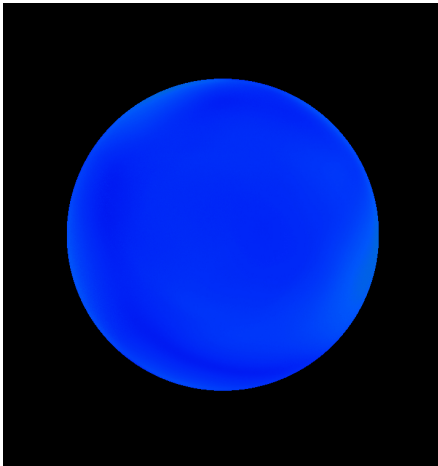
Rendered Images



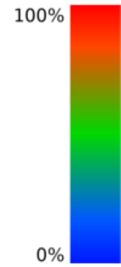
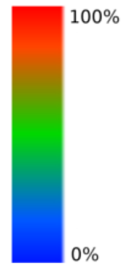
SGD



Reference



SGD (Lab difference)



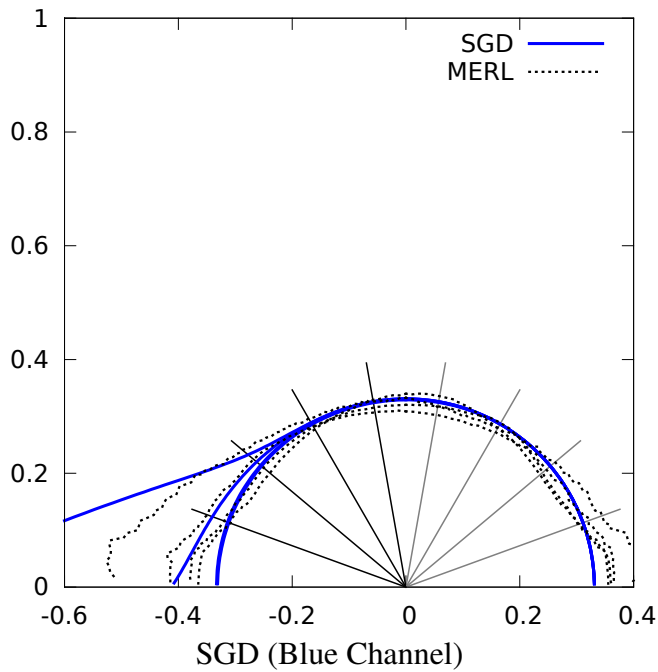
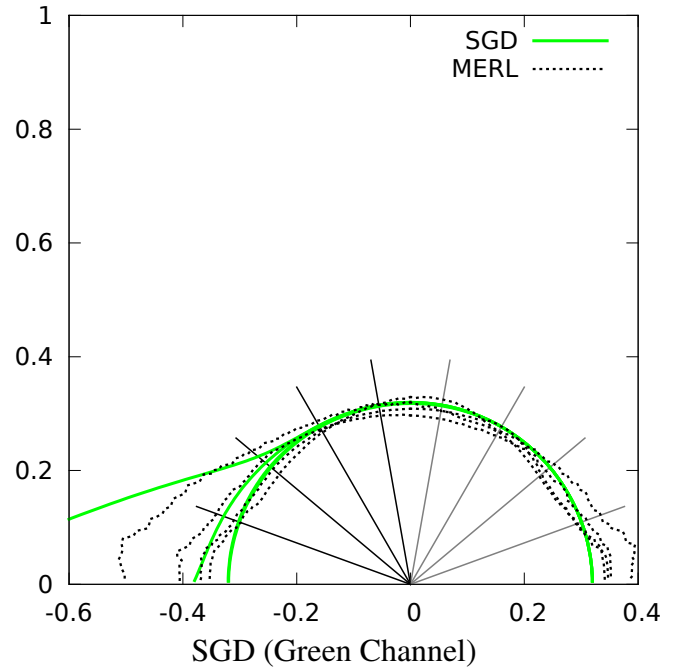
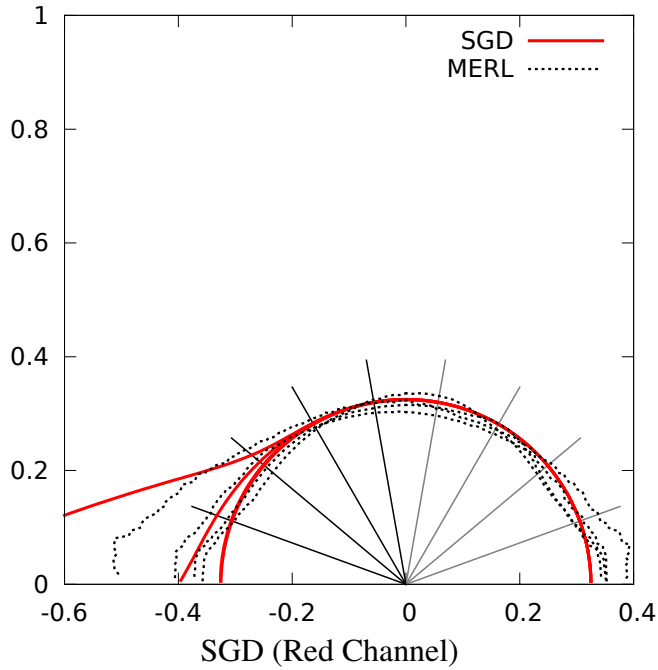
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.10784	0.0375359	0.0583526	9.1836e-12	0.0528459	0.0578589	18.1669	0.00113864
Green	0.102669	0.0296317	0.0520763	5.41897e-13	0.0854122	0.0971296	20.2291	0.00114867
Blue	0.113943	0.0364218	0.063905	3.47708e-12	0.0860966	0.0985717	16.6809	0.00119185

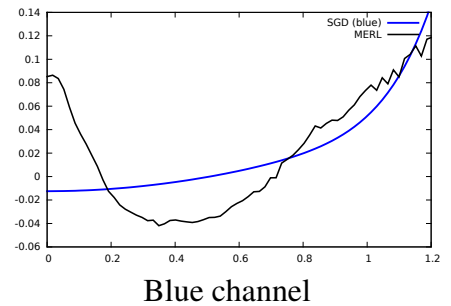
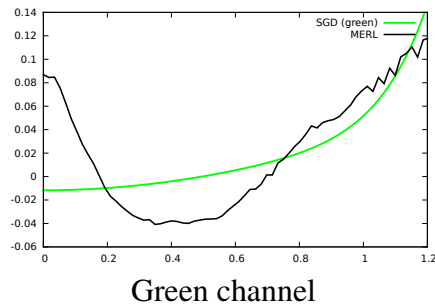
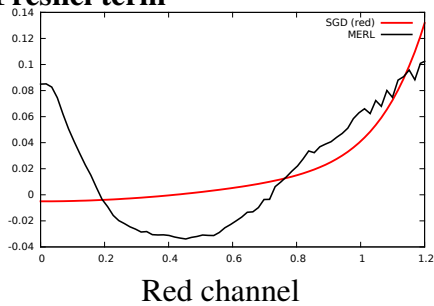
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.60692	0.172556	13.5006	0.561147
Green	4.77932	0.23927	13.9648	0.587176
Blue	4.46485	0.138435	13.1165	0.54153

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

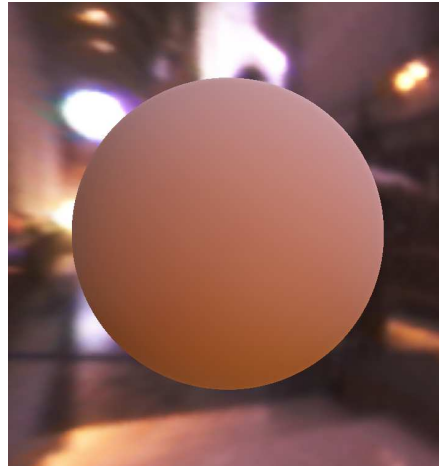


Material Name: *white-fabric*

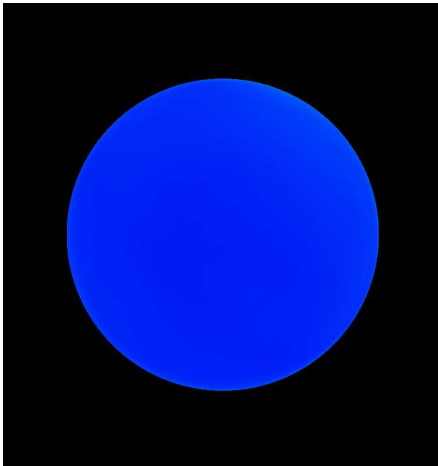
Rendered Images



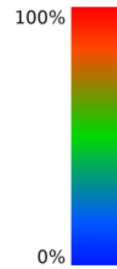
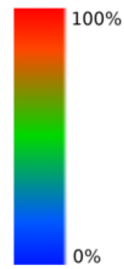
SGD



Reference



SGD (Lab difference)



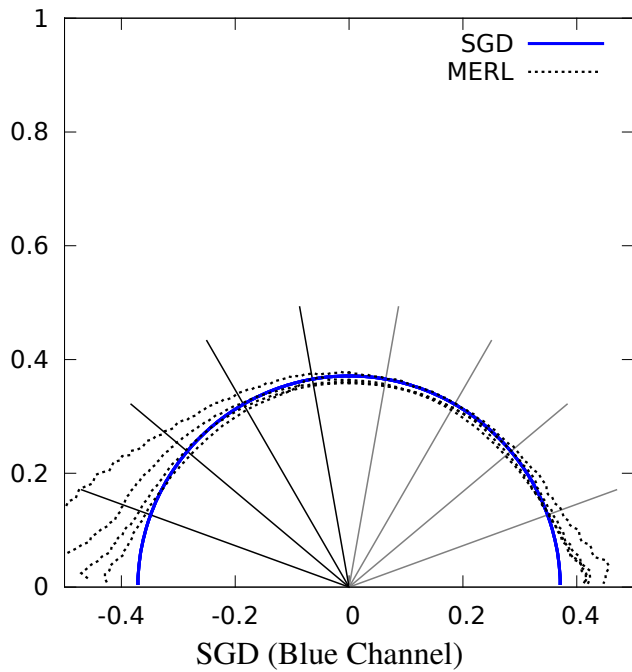
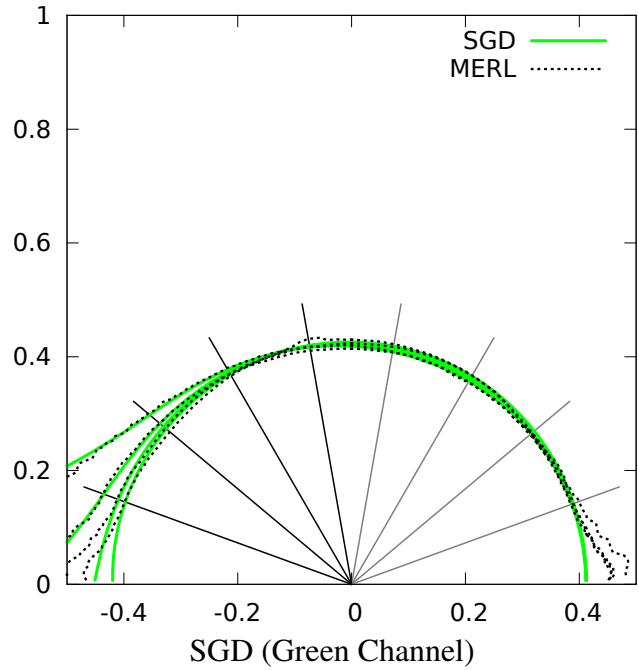
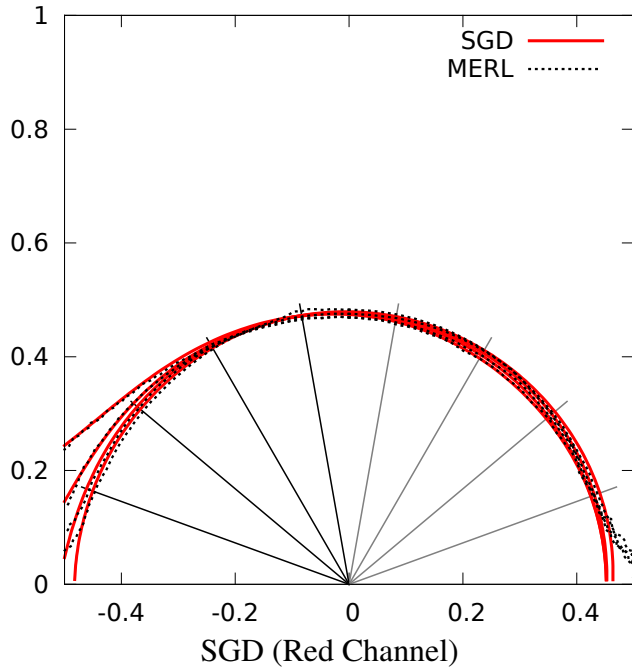
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.290107	0.230066	0.479844	0.669662	7.17773e-14	-0.209237	3.60967	0.000728813
Green	0.219835	0.156787	0.196767	2.22894e-13	0.0364632	-0.0528699	6.18732	0.000806025
Blue	0.160654	2.19005e-12	0.162438	0.194582	1	0	6.91147	0.00177083

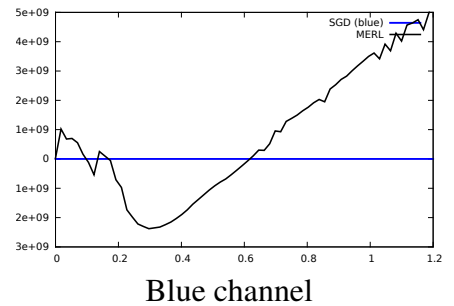
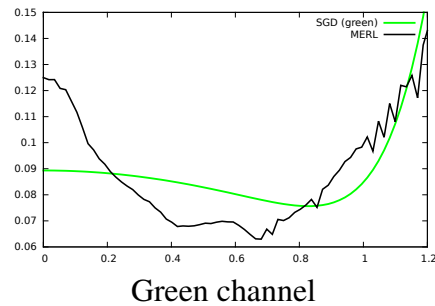
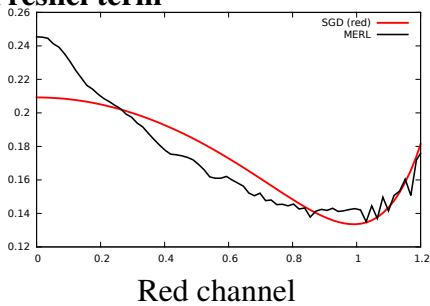
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.17095	0.0379118	7.221	0.195346
Green	2.60737	0.0990846	7.95861	0.409992
Blue	3.42418	0.00860197	11.4289	0.225019

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *white-marble*

Rendered Images



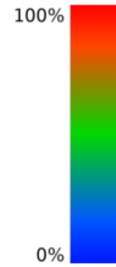
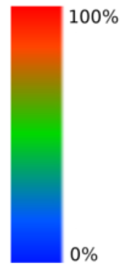
SGD



Reference



SGD (Lab difference)



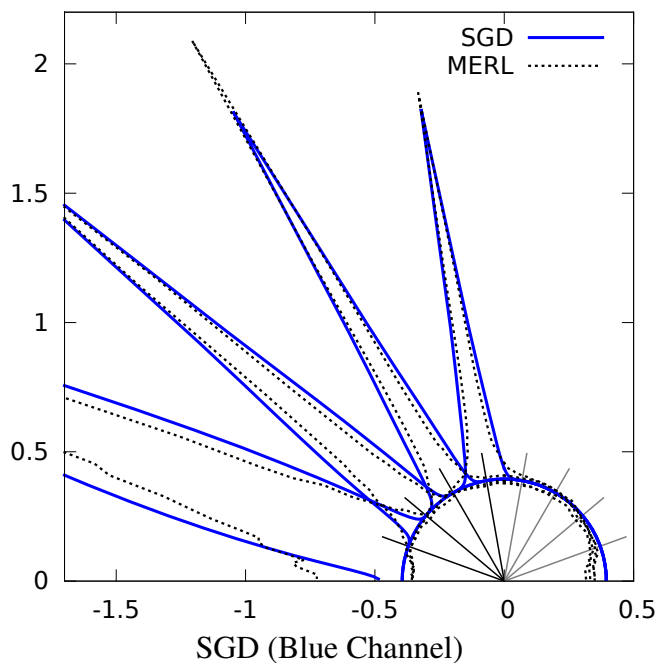
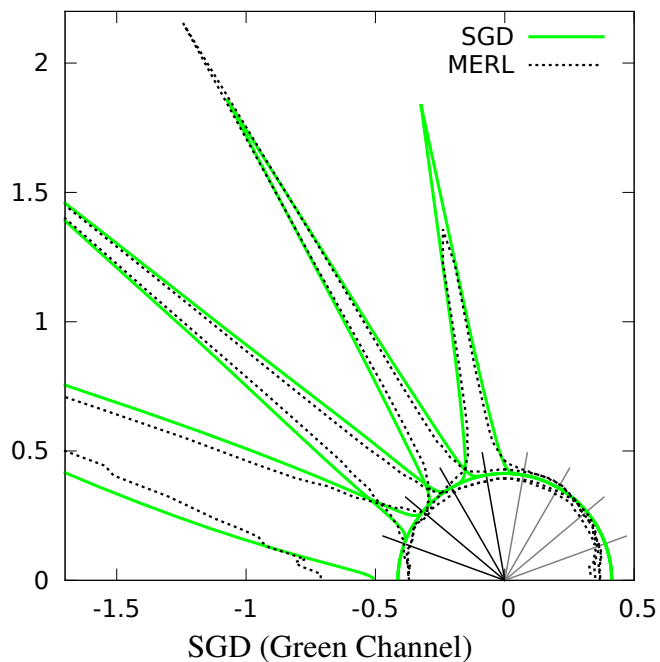
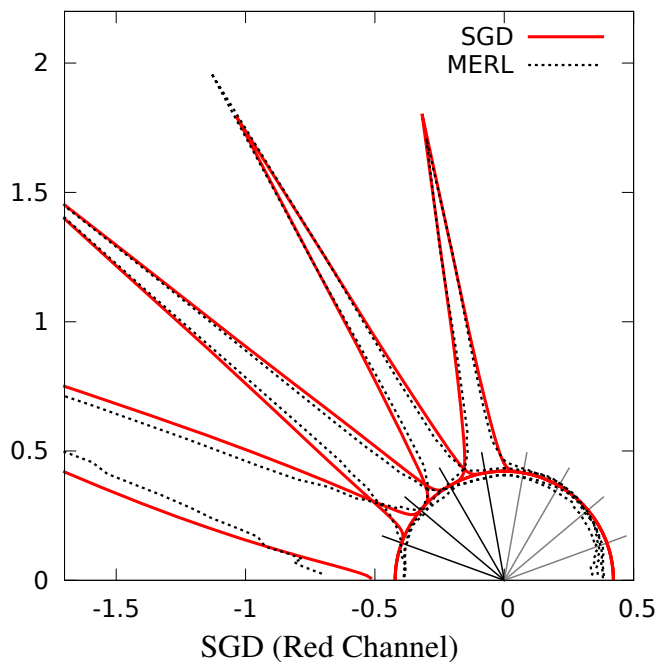
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.236183	0.24075	0.00430204	0.681306	0.118569	0.0620704	103.053	0.0493991
Green	0.221746	0.221456	0.00429388	0.676061	0.167963	0.102032	104.312	0.0689784
Blue	0.192889	0.23389	0.00405907	0.620701	0.140415	0.071968	122.169	0.0584648

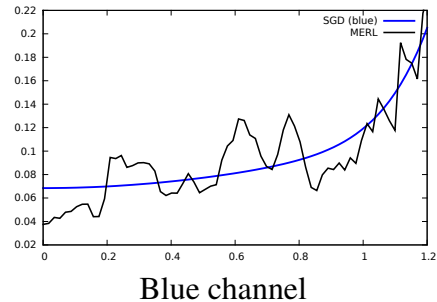
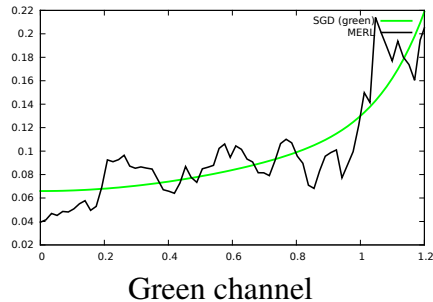
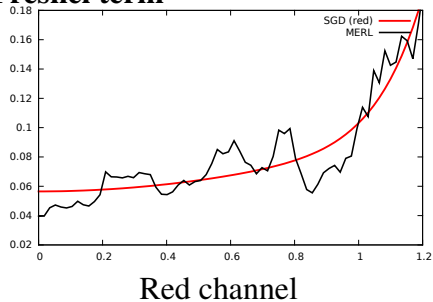
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.0396	1.08288e-07	88.7766	0.378101
Green	1.05866	6.82995e-08	89.0261	0.372681
Blue	1.26372	5.76023e-08	88.95	0.371975

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *white-paint*

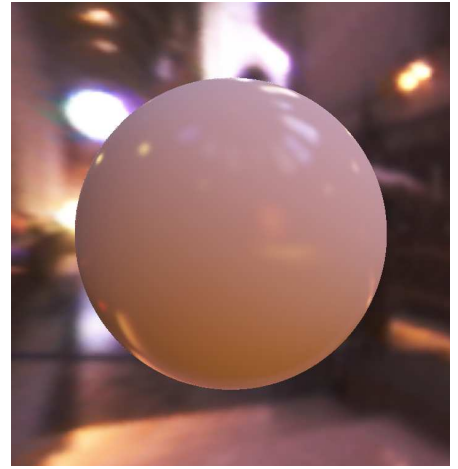
Rendered Images



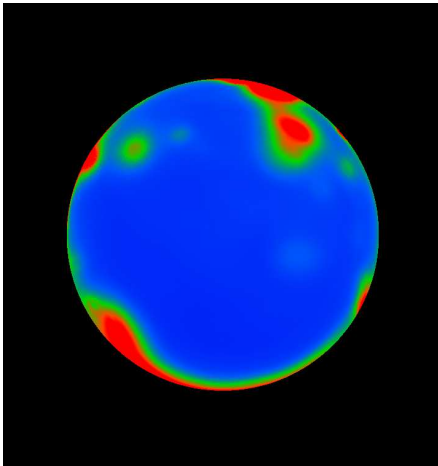
SGD



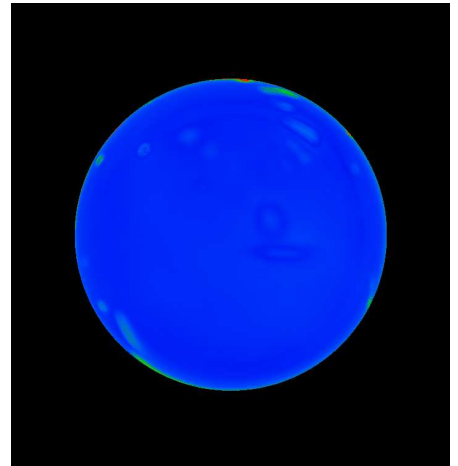
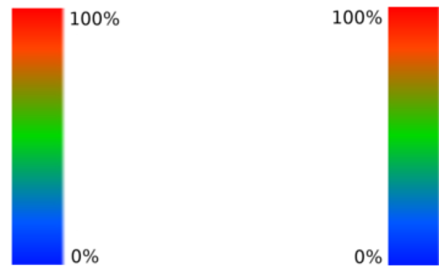
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

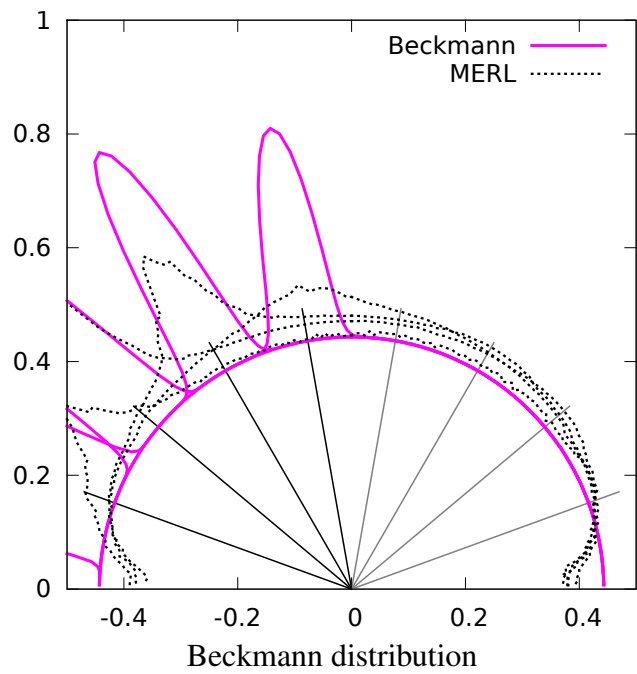
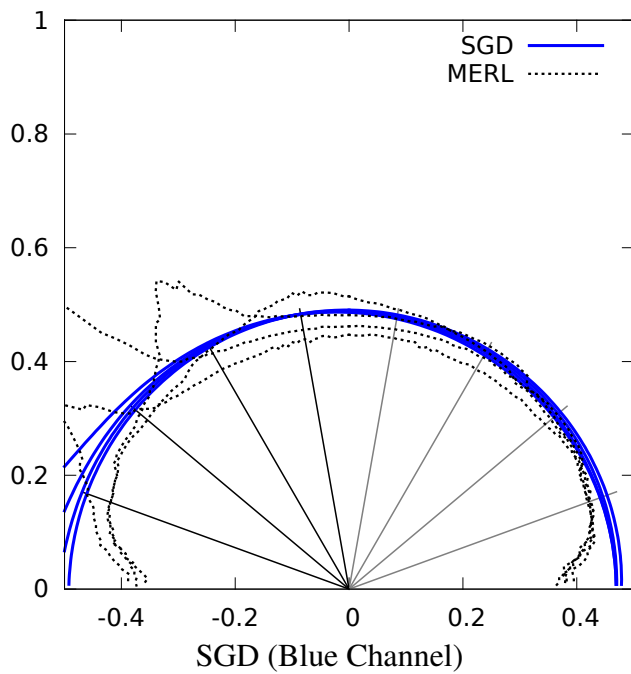
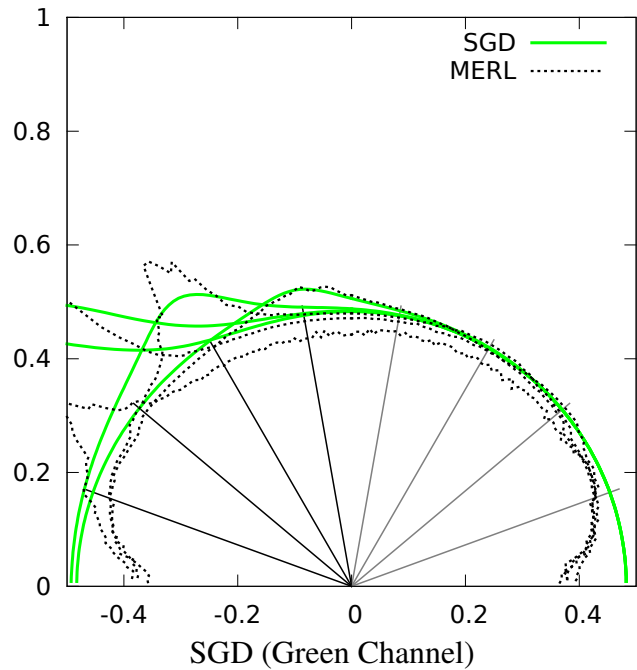
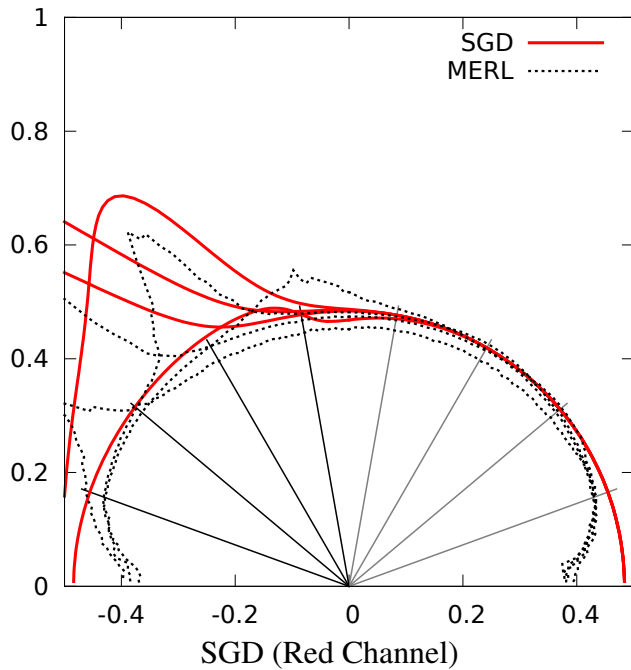
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.356024	4.14785	0.0654126	0.796927	0.0770738	0.0782297	8.89985	0.160631
Green	0.3536	0.255488	0.0841905	0.7778	0.25087	0.226285	7.66809	0.0657026
Blue	0.324889	0.108438	0.538225	0.888627	1.75144e-13	-0.367441	3.59697	0.0710504

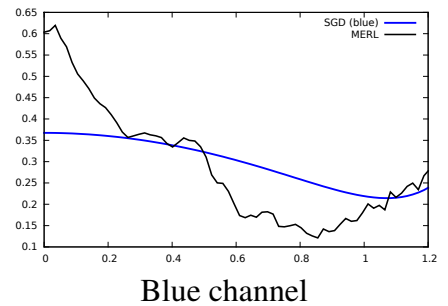
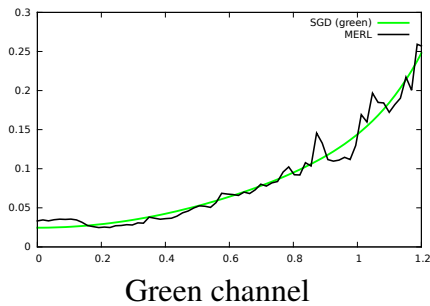
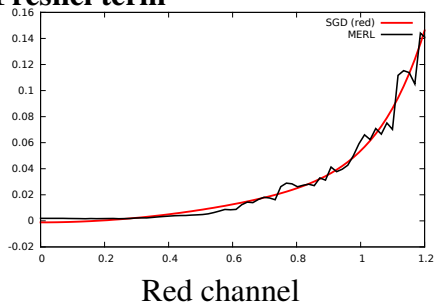
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	1.96428	5.9674e-08	31.0512	-0.0896936
Green	2.23069	1.07673e-07	27.6872	-0.151411
Blue	2.23051	0.0280623	7.41492	0.154604

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *yellow-matte-plastic*

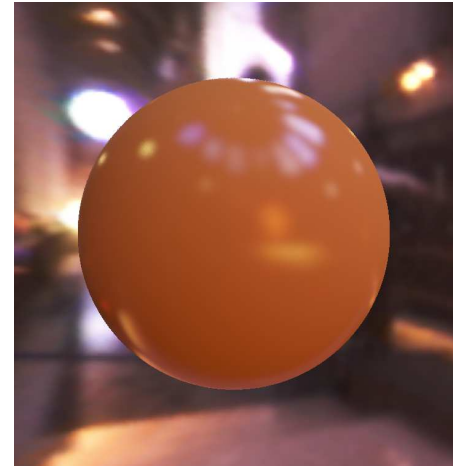
Rendered Images



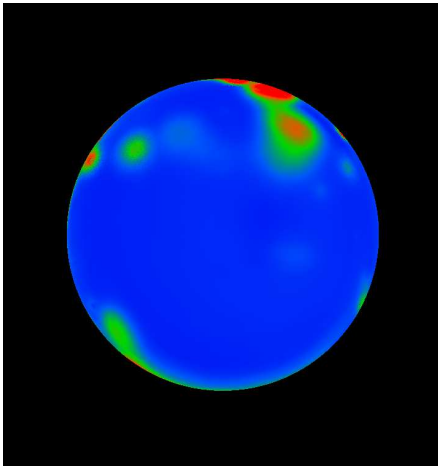
SGD



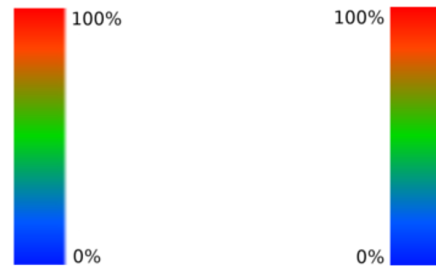
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

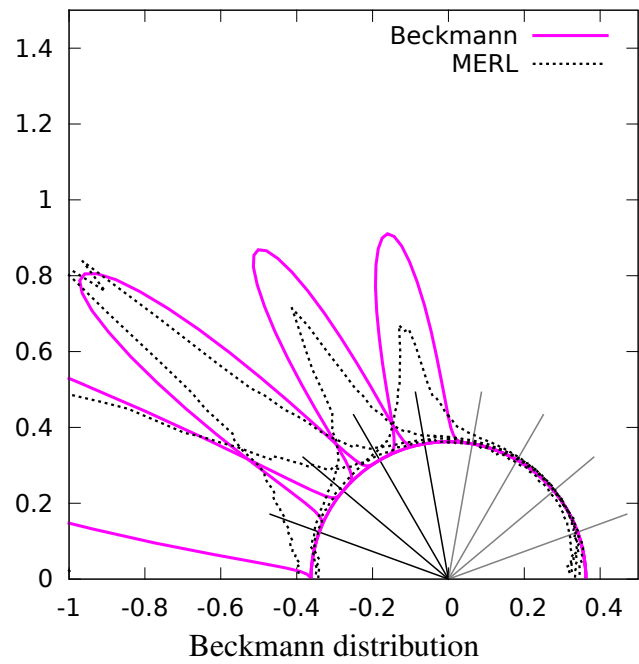
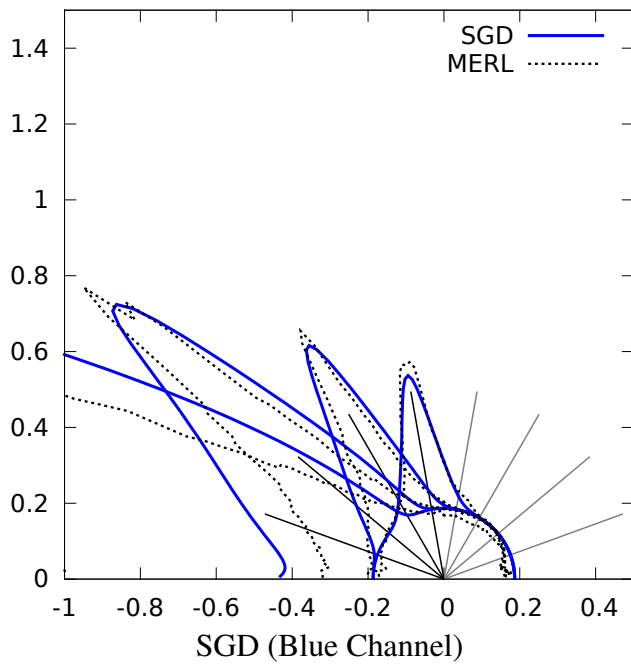
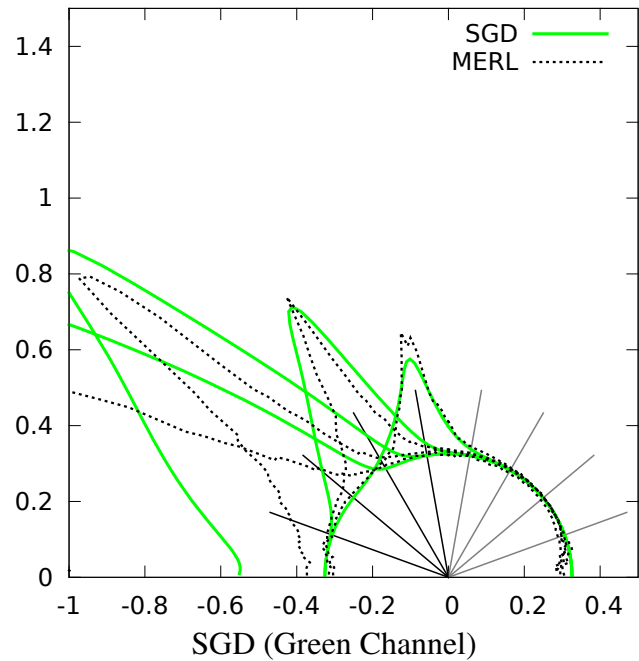
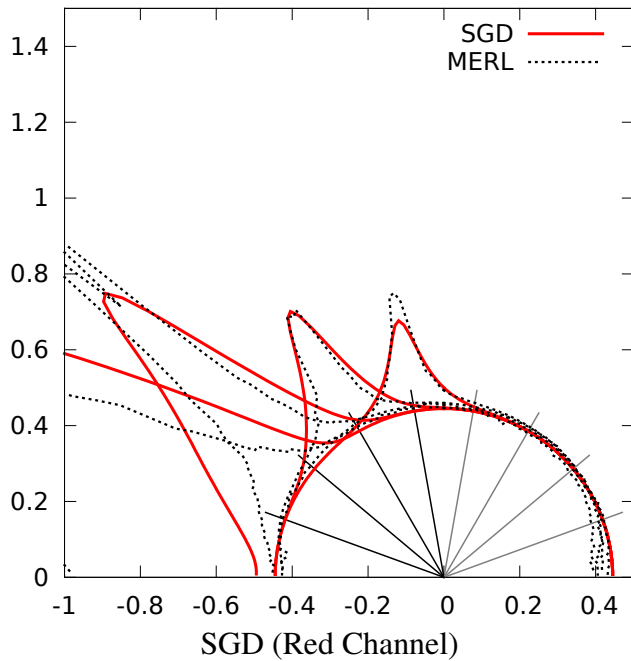
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.276745	0.806628	0.0237573	0.558101	0.0624565	0.049915	26.7398	0.0469972
Green	0.108557	1.99624	0.0265756	0.537647	0.0605404	0.0567466	24.8437	0.10918
Blue	0.0203686	0.977002	0.0305873	0.710679	0.0541077	0.0473569	17.6137	0.0466045

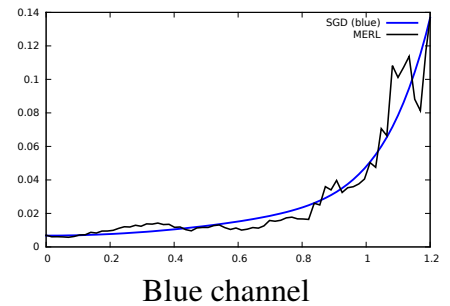
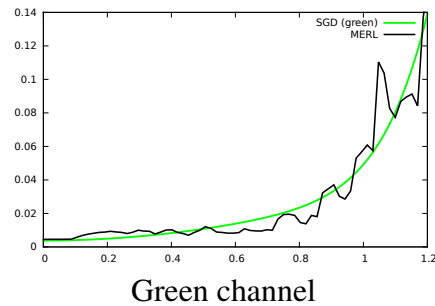
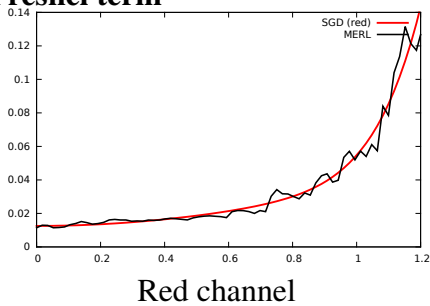
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.1481	5.99553e-08	41.7723	0.11569
Green	2.32064	5.96103e-08	39.7008	0.0891281
Blue	1.65758	6.38097e-08	40.1979	0.0886802

BRDF lobes in the incidence plane (Cubic root applied)

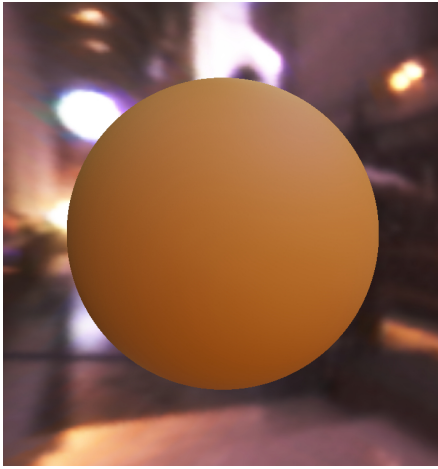


Fresnel term

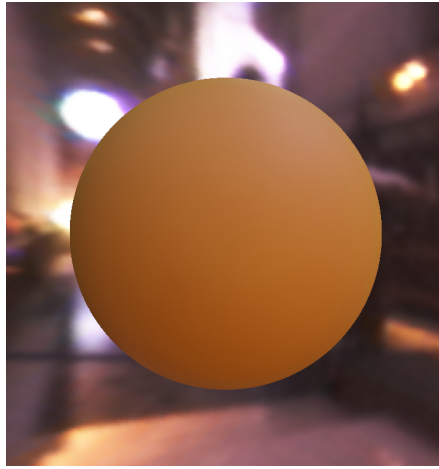


Material Name: *yellow-paint*

Rendered Images



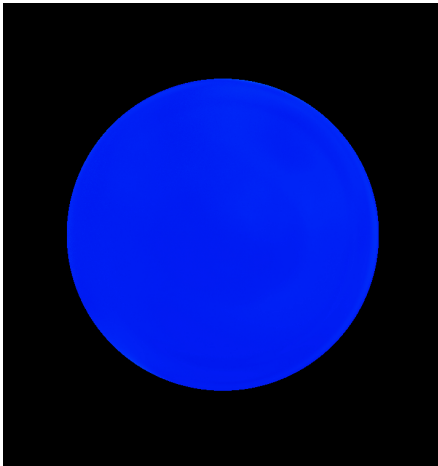
SGD



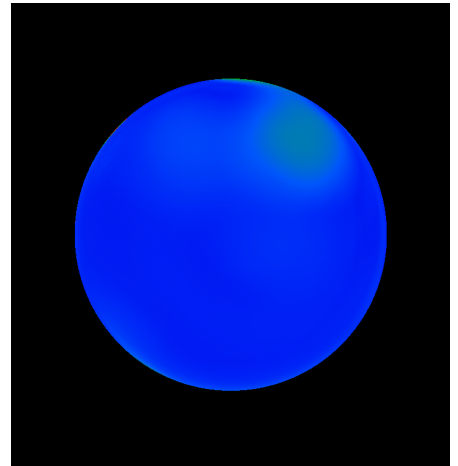
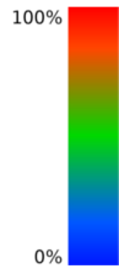
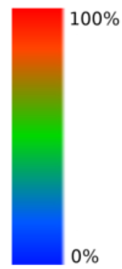
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

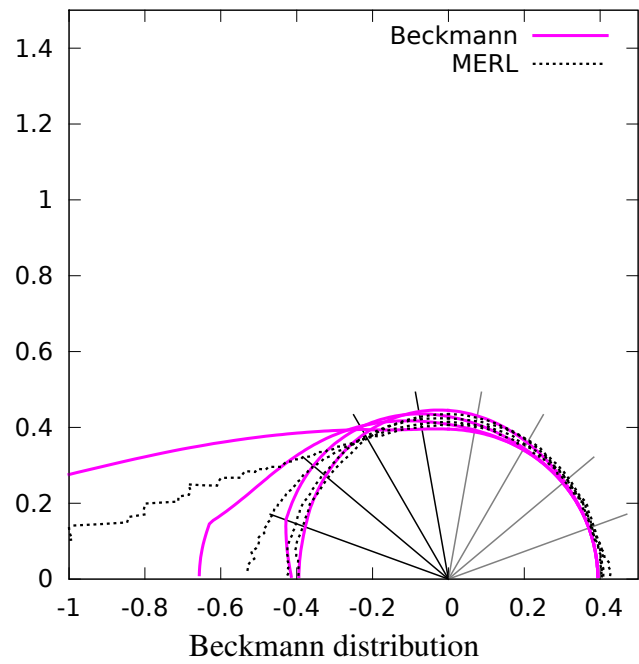
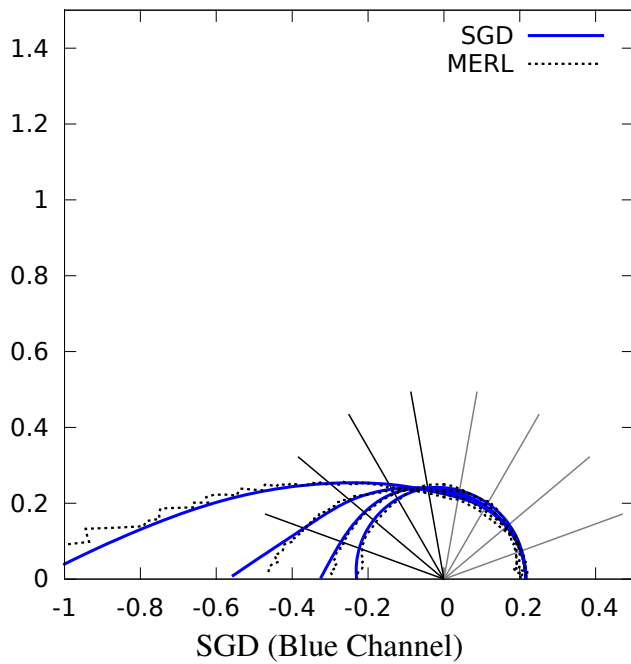
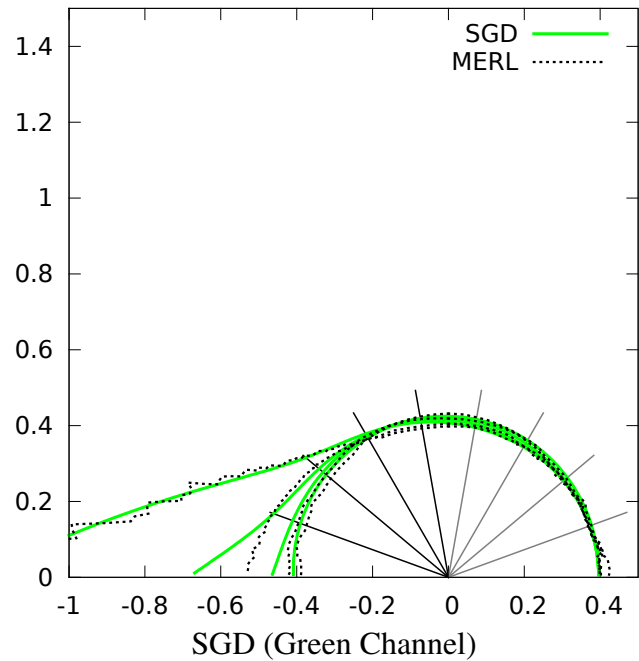
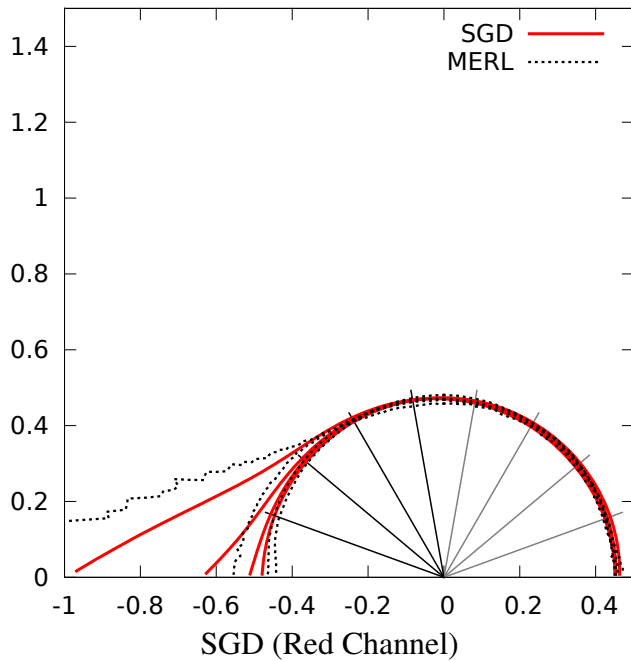
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.288876	0.449392	0.650734	1.21986	0.00201415	-0.0897316	3.83308	0.00152911
Green	0.195348	0.412812	0.190849	0.0333524	7.31639e-13	-0.0639292	6.31195	0.00123385
Blue	0.0314583	0.168707	0.16131	0.137577	0.13481	0.103378	7.06429	0.000424783

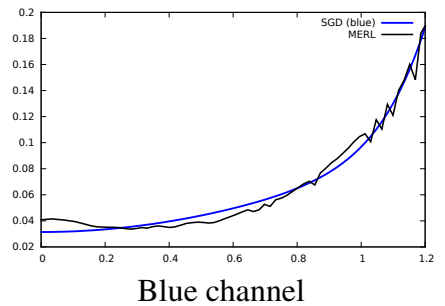
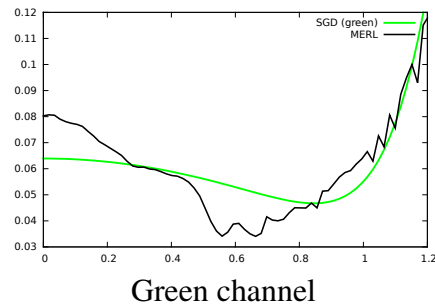
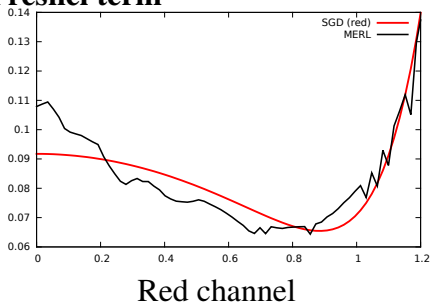
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	2.18358	0.0298708	7.1694	0.146537
Green	2.72018	0.0764778	8.39507	0.387991
Blue	3.26561	0.0198928	10.5682	0.292185

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term



Material Name: *yellow-phenolic*

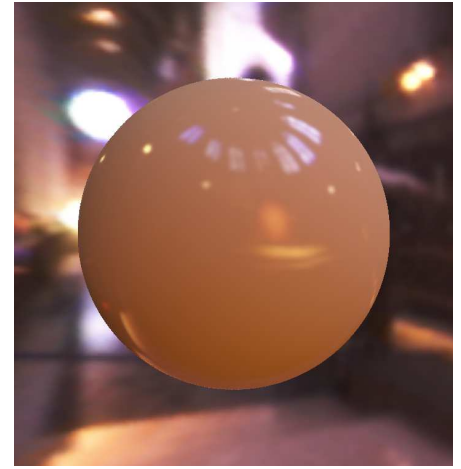
Rendered Images



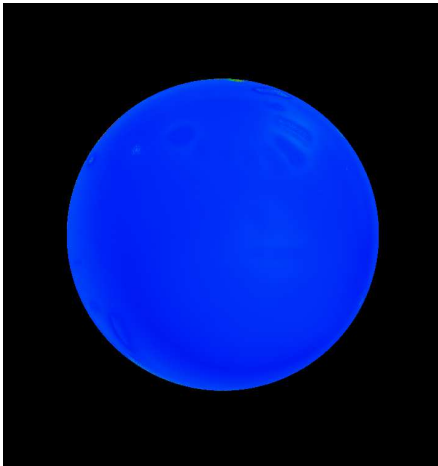
SGD



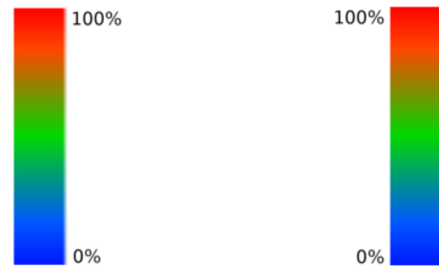
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

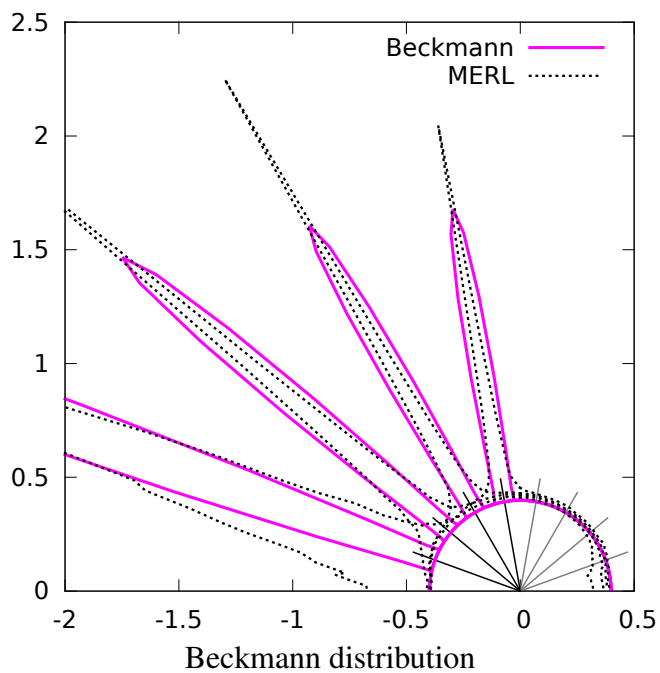
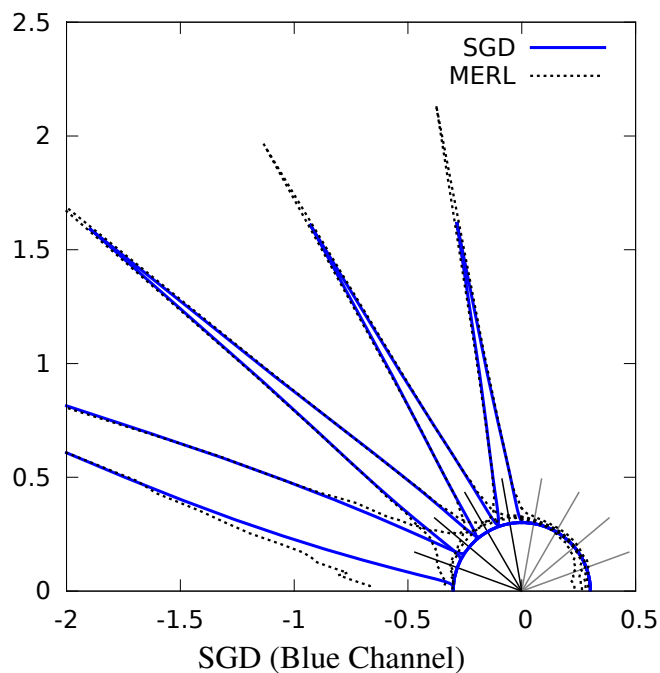
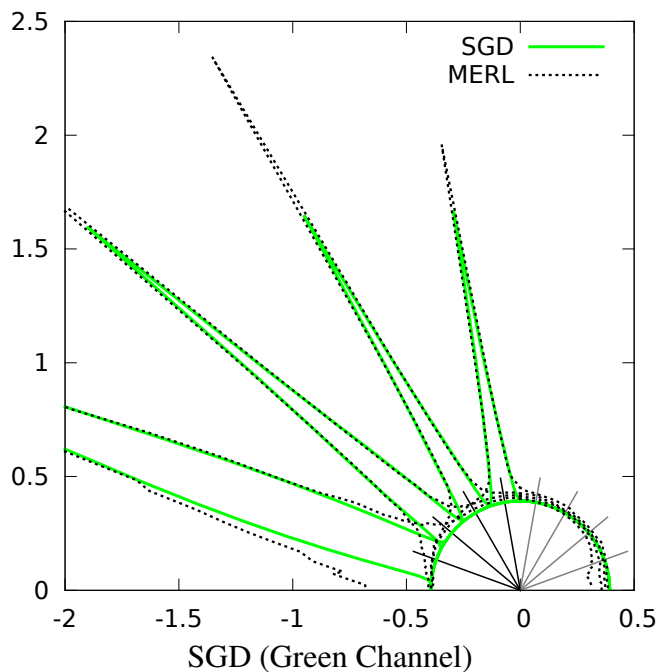
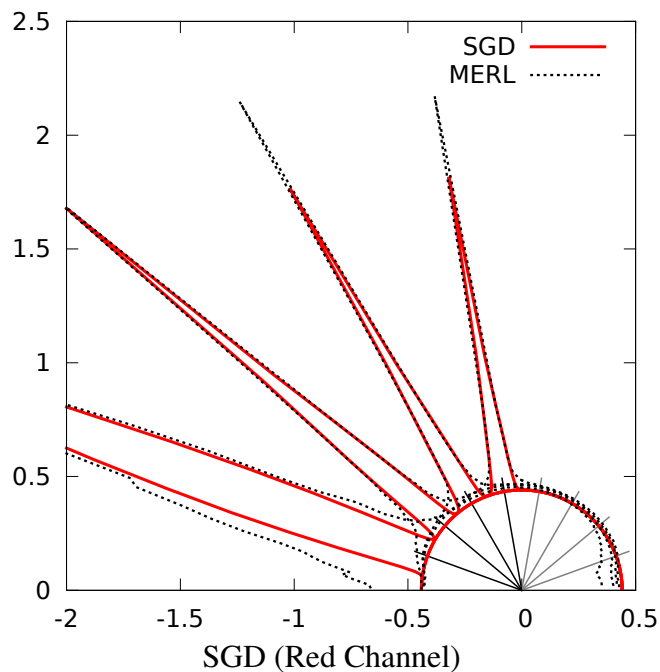
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.26924	0.0861694	0.00126171	0.444222	0.0988294	0.0295258	509.34	0.0238647
Green	0.190177	0.0960246	0.00197611	0.512534	0.120249	0.0539044	294.418	0.0190162
Blue	0.0858303	0.122709	0.00187166	0.504223	0.0929719	0.0471952	314.704	0.0173945

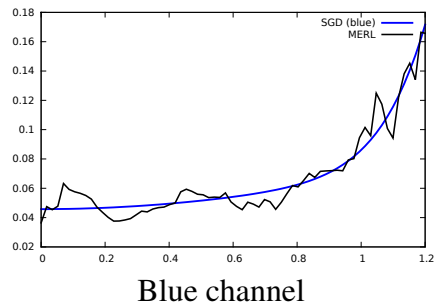
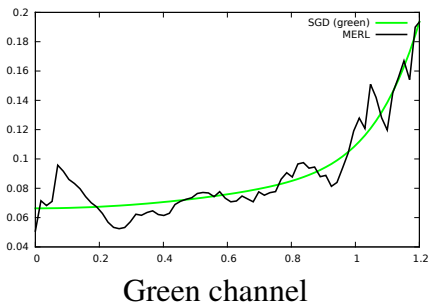
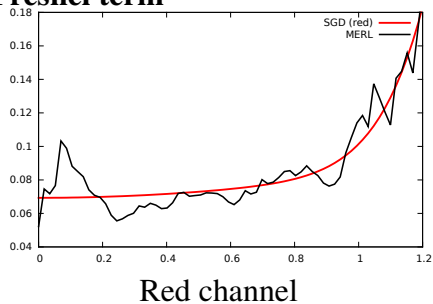
Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.59604e-08	15.6472	8.52565	0.561753
Green	1.76251	6.5671e-08	116.04	0.425536
Blue	1.81658	9.96466e-08	118.064	0.432459

BRDF lobes in the incidence plane (Cubic root applied)

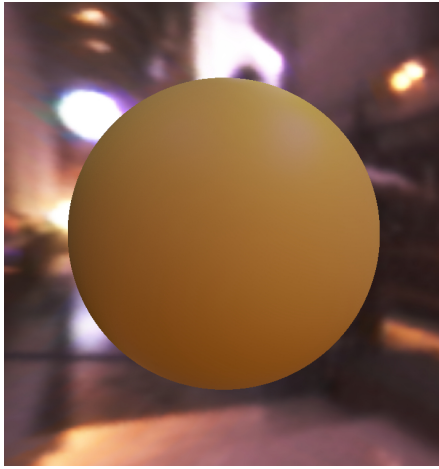


Fresnel term

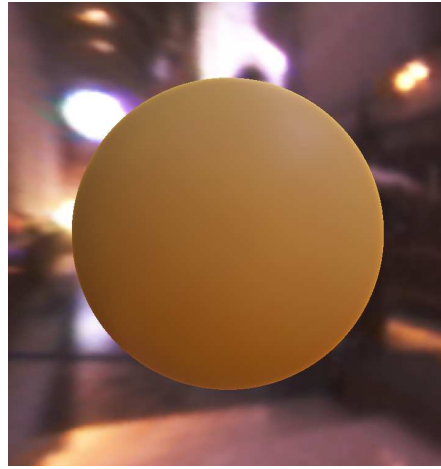


Material Name: *yellow-plastic*

Rendered Images



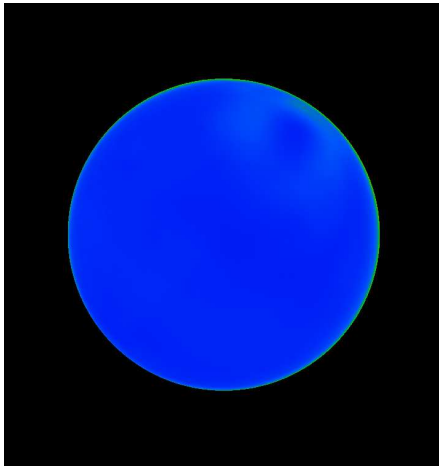
SGD



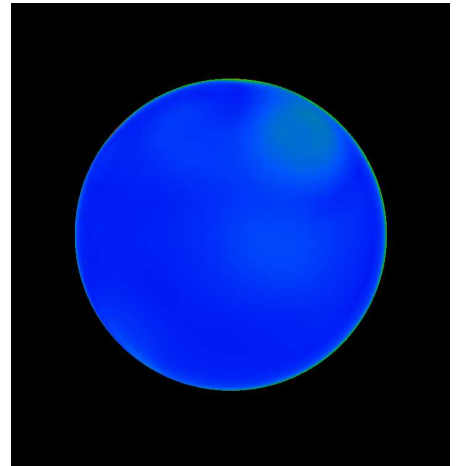
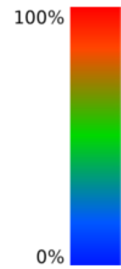
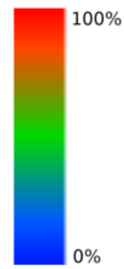
Reference



Beckmann



SGD (Lab difference)



Beckmann (Lab difference)

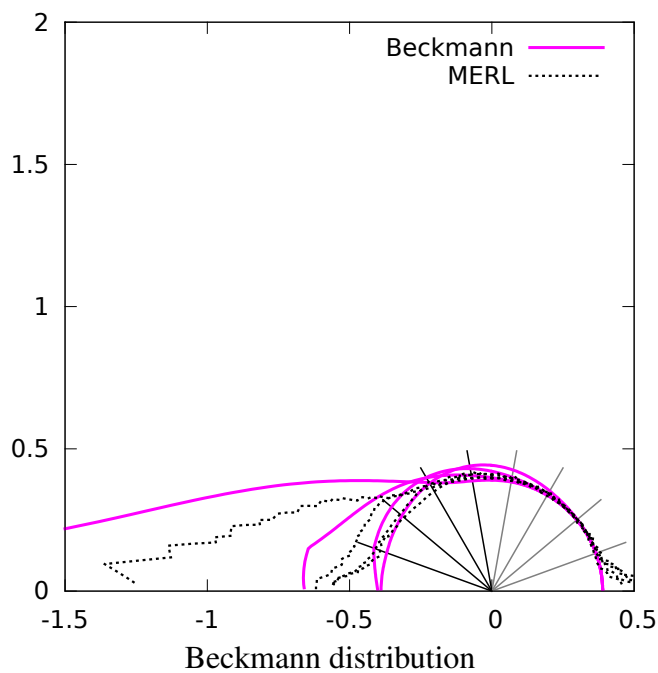
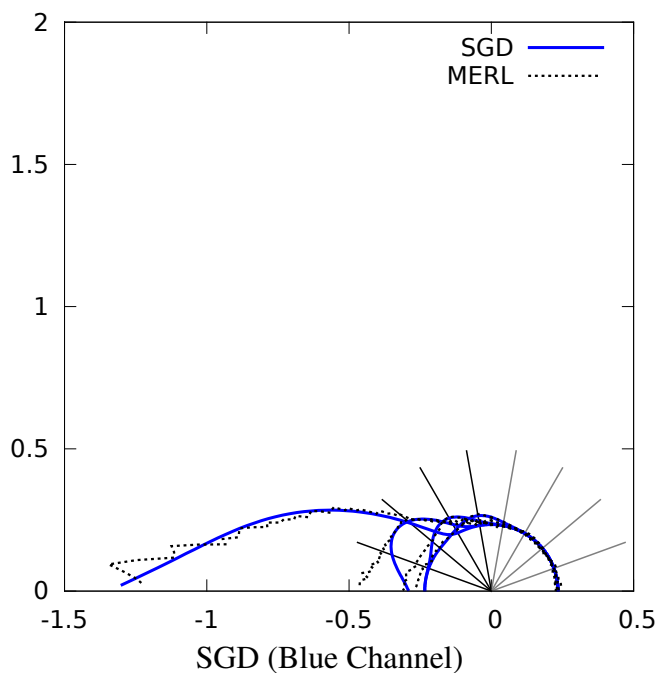
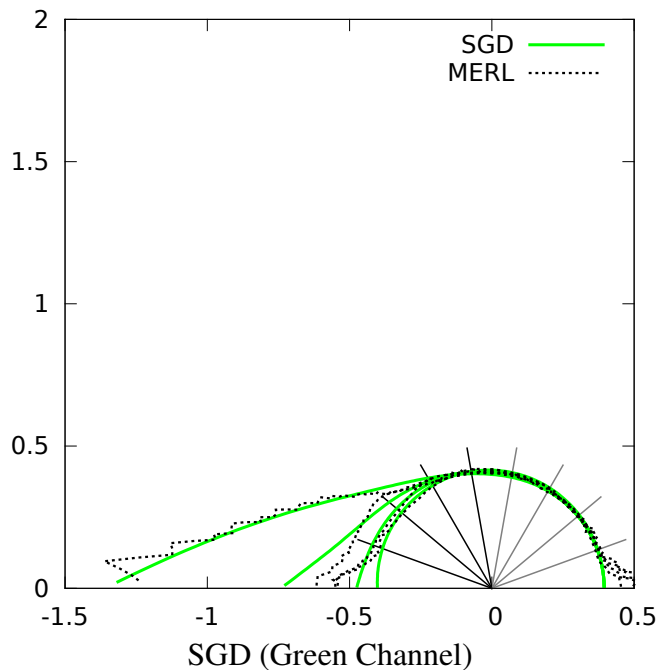
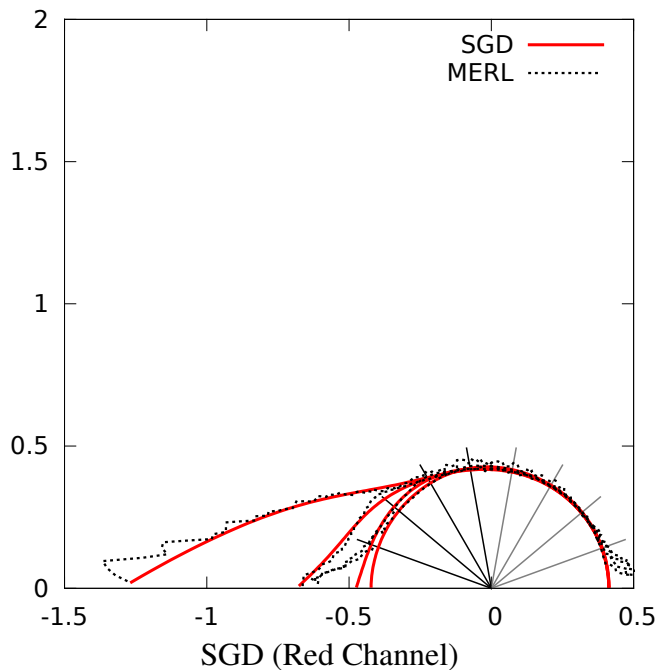
SGD fitted parameters and absolute fitting error

Channel	ρ_d	ρ_s	α	p	F_0	F_1	$K_{\alpha,p}$	error
Red	0.221083	0.265199	0.280789	0.920018	0.144471	0.113592	3.85808	0.00125483
Green	0.193042	0.340361	0.146396	0.0356237	0.10845	0.0663735	7.84753	0.00140731
Blue	0.0403393	0.0670333	0.0248514	7.80502e-12	0.125678	0.103644	41.2517	0.00101943

Shadowing / Masking fitted parameters

Channel	λ	c	k	θ_0
Red	4.34432	1.04213e-07	18.6813	-0.60265
Green	3.16869	0.055929	9.73614	0.393386
Blue	5.71439	7.84273	16.4495	0.781122

BRDF lobes in the incidence plane (Cubic root applied)



Fresnel term

